

## Appendix C

### National Type Evaluation Technical Committee Weighing Sector

September 25 - 27, 2005 – Columbus, Ohio  
Meeting Summary

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## Carry-over Items

### 1. Recommended Changes to Publication 14 Based on Actions at the 2005 NCWM Annual Meeting

The NTEP technical advisor provided the Sector with specific recommendations for incorporating test procedures and checklist language based upon actions of the 2005 Annual Meeting of the National Conference on Weights and Measures (NCWM). The Sector was asked to briefly discuss each item and provide general input on the technical aspects of the issues.

(a) Footnote to S.1.8.4.

**Background:** See the Report of the 90<sup>th</sup> NCWM, Specifications and Tolerances (S&T) Committee Agenda Item 320-1 for additional background information. During its 2005 Annual Meeting, the NCWM agreed to amend NIST Handbook 44 Scales Code paragraph footnote to S.1.8.4. Recorded Representations, Point-of-Sale Systems to nonretroactively prohibit the use of the “#” symbol.

**Discussion:** The Weighing Sector considered a proposal from the NIST Technical Advisor to amend NCWM Publication 14 Weighing Devices Technical Policy, Checklists, Test Procedures Digital Electronic Scales (DES) Section 76. List of Acceptable Abbreviations and Symbols and Electronic Cash Registers Interfaced with Scales (ECRS) Section 11 Recorded Representation Point-of-Sale Systems.

**Recommendation:** The Sector recommends that amendments proposed in [Appendix A-Agenda Item 1\(a\)](#) be incorporated into NCWM Publication 14 DES Section 76. List of Acceptable Abbreviations and ECRS Section 11. Recorded Representation Point-of-Sale Systems.

(b) Automatic Zero-Setting Mechanism (Zero-tracking)

**Background:** See the Report of the 90<sup>th</sup> NCWM, Specifications and Tolerances (S&T) Committee Agenda Item 320-4 for additional background information. During its 2005 Annual Meeting, the NCWM agreed to amend NIST Handbook 44 2.20. Scales Code paragraph S.2.1.3. Scales Equipped with an Automatic Zero-Setting Mechanism (AZSM), add new paragraphs S.2.1.3.1. Zero-Tracking for Scales Manufactured between January 1, 1981, and January 1, 2007, and S.2.1.3.2. Zero-Tracking for Scales Manufactured on or After January 1, 2007, and renumber paragraph S.2.1.3.3. Means to Disable Zero-Tracking on Class III L Devices.

**Discussion:** The Weighing Sector considered a proposal from the NIST Technical Advisor to amend NCWM Publication 14 Weighing Devices Technical Policy, Checklists, Test Procedures Digital Electronic Scales (DES) Section 43. The NIST Technical Advisor responded to a question on the AZSM requirements for Class III vehicle scales, Class III L scales, and Class III L scales. The language that was adopted by the NCWM states that the AZSM limit for vehicle, axle-load, and railway track scales is 3.0 scale divisions for both Class III and III L Vehicle Scales. Wheel-load weighers must meet the same requirements as other scales in paragraph S.2.1.3.2. (b).

**Recommendation:** The Sector recommends that amendments proposed in [Appendix A-Agenda Item 1\(b\)](#) be incorporated into NCWM Publication 14 DES Section 43. Automatic Zero-Setting Mechanism.

(c) Table S.6.3.b. Note 3 – Nominal Capacity and Value

**Background:** See the Report of the 90<sup>th</sup> NCWM, Specifications and Tolerances (S&T) Committee Agenda Item 320-5 for additional background information on the location and content for the marking of nominal capacity by division. During its 2005 Annual Meeting, the NCWM agreed to amend NIST Handbook 44 2.20. Scales Code Table S.6.3.b. Note 3 – Nominal Capacity and Value.

**Discussion:** The Weighing Sector considered a proposal from the NIST Technical Advisor to amend NCWM Publication 14 Weighing Devices Technical Policy, Checklists, Test Procedures Digital Electronic Scales (DES) Sections 1 and 2, and Electronic Cash Registers Interfaced with Scales (ECRS) Sections 5 and 7.

The Sector requested clarification on what is meant by the phrase “readily apparent by the design of the device” in the previous editions of Handbook 44 Scales Code Table S.6.3.b. Note 3. They also reported that field officials, in both the United States and Canada, have repeatedly raised questions and suggested that pictures or diagrams be included in Publication 14 that demonstrate the meaning of the existing language. The Sector also suggested that examples of acceptable “capacity by value” markings and that the terms “Max,” “min,” and “e” be included in Publication 14 as examples of acceptable markings for “capacity by value.”

**Recommendation:** The Sector recommends that amendments in [Appendix A-Agenda Item 1\(c\)](#) be incorporated into NCWM Publication 14 DES with the three drawings from the Report of the 90<sup>th</sup> NCWM, S&T Committee Agenda Item 320-5 and an example using the international markings such as “Max,” “e<sub>min</sub>,” and “d” be included in Publication 14<sup>1</sup>. Additionally, the Sector recommended that examples such as single revolution dials, beam scales<sup>2</sup> (excluding tip weights) be added to Publication 14 to demonstrate what is meant by the phrase “readily apparent by the design of the device.”

***NIST Technical Advisor’s Notes:***

1. The Sector recommendation to amend the capacity markings sections of Publication 14 in [Appendix A-Agenda Item 1\(c\)](#) have been consolidated with the Sector recommend changes in Agenda Item 20. Permanence Tests for Identification Information.
2. WMD disagrees with the recommendation to exclude beam scales with tip weights from the capacity by division marking requirements. The example of a portable platform scale with supplemental weights should be required to be marked with a capacity by division statement since the sum of the supplemental weights are not readily apparent when viewing the reading face of the scale. Additionally, supplemental weights that are normally furnished with the scale may have been removed or additional weights may have been added which, according to the definition of “nominal capacity” in Handbook 44 Appendix D, would change its “nominal capacity”. If supplemental weights are added in addition to the weights normally supplied with the scale, the scale would be overloaded beyond its intended capacity for both shift and increasing load tests. If weights were removed, shift tests would not be conducted with the appropriate amount of weight based on the intended scale capacity. Markings that included the nominal capacity would make the field inspector and user aware of the intended capacity of the scale for both use and test whether or not supplemental weights have been added to or removed from the scale.

During the discussion of this item the Sector noted that the use of “d” and “e” are used interchangeably in NIST Handbook 44. This can lead to the incorrect application of requirements applied to weighing devices where the scale division “d” is different than the verification division “e.” Additionally, the terms graduation, interval, and division are not consistently used throughout the Scale Code. A small work group consisting of Darrell Flocken (Mettler Toledo), Gary Lameris (Hobart Corporation), the Ohio NTEP Lab, and Paul Lewis (Rice Lake Weighing) will review the entire Scales Code and develop a recommendation to amend Handbook 44 so that the abbreviations, terms, and definitions are used correctly and consistently in the code.

(d) Time Dependence (Creep Test) for Scales

**Background:** See the 2005 NCWM Publication 16 Committee Reports of the 90<sup>th</sup> National Conference on Weights and Measures, Specifications and Tolerances Committee Agenda item 320-8 for additional background information. During its 2005 Annual Meeting, the NCWM agreed to amend NIST Handbook 44. Scales Code paragraph T.N.4.5. Time Dependence. and add new paragraphs T.N.4.5.1., Time Dependence Class II, III, and IIII Non-automatic Weighing Instruments, and T.N.4.5.2. Time Dependence; Class III L Non-automatic Weighing Instruments.

**Discussion:** The Weighing Sector considered a proposal from the NIST Technical Advisor to amend NCWM Publication 14 Weighing Devices Technical Policy, Checklists, Test Procedures Digital Electronic Scales (DES) Section 58. Time Dependence Test. Some members of the Sector requested clarification on the ambient test conditions and automatic zero-tracking information in the proposed test form. The NIST Technical Advisor reported that the ambient test conditions recorded on the test form are the same as the test forms used in OIML R 76-2. The information on the test form regarding the operational status of the AZSM was considered as optional information and is not on the

equivalent OIML test form and will be removed from the proposed test form. The Sector questioned the meaning of some of the symbols in the proposed test form and suggested that they be defined on the test form.

There were additional discussions that existing test procedures in Publication 14 requires that the creep test be performed at 20 °C, -10 °C, and 40 °C. OIML R 76 states that only one influences factor be tested at one time and that performing creep test at the various temperatures is considered as combining the influence factors of time and temperature. Members of the Sector believed that this subject should be submitted to Sector as a new agenda item, or be considered by the NCWM Specifications and Tolerance Committee.

**Recommendation:** The Sector recommends that amendments in [Appendix A-Agenda Item 1\(d\)](#), with changes to the test form recommended by the Sector, be incorporated into NCWM Publication 14.

(e) Time Dependence (Creep Test) for Load Cells

**Background:** See the 2005 NCWM Publication 16 Committee Reports of the 90<sup>th</sup> National Conference on Weights and Measures, Specifications and Tolerances Committee Agenda item 320-8 for additional background information regarding load cell creep test tolerances during type evaluation. During its 2005 Annual Meeting, the NCWM agreed to add NIST Handbook 44 Scales Code paragraph T.N.4.6. Time Dependence for Load Cells During Type Evaluation and Table T.N.4.6. Maximum Permissible Error (mpe) for Load Cells During Type Evaluation.

**Discussion:** The NIST Technical Advisor reported that NIST Weights and Measures Division (WMD) will be submitting a proposal to a regional weights and measures association S&T committee to add creep recovery test procedures that were inadvertently omitted from the proposal to add the Time Dependence requirements and lower the apportionment factors to better align NIST Handbook 44 with the 2005 Edition of NCWM Publication 14.

The Weighing Sector also considered a proposal from the NIST Technical Advisor to amend NCWM Publication 14 Weighing Devices Technical Policy, Checklists, Test Procedures for Force Transducers Section L. II Determination of Creep.

**Recommendation:** The Sector recommends that the proposed language provided by the NIST Technical Advisor with editorial corrections to the language as recommended by the Sector in [Appendix A-Agenda Item 1\(e\)](#) be included in the 2006 Edition of NCWM Publication 14 Force Transducers (Load Cells).

The NIST Technical Advisor has submitted a proposal to the Southern Weights and Measures Association S&T Committee that would correct the tolerances applied to Class III L load cells and add the creep recovery tolerances that were inadvertently omitted in the 2005 NCWM S&T Committee agenda item 320-8.

Pending action by the 91<sup>st</sup> NCWM Specification and Tolerances Committee in 2006 on this WMD proposal, the Sector recommends that no corresponding changes should be made to Table T.N.4.6. in the proposal to amend Publication 14 and that the creep test recovery procedures be deleted from the language submitted by the NIST Technical Advisor.

## 2. Identification: Built-for-Purpose Software-based Devices

**Background:** See the 2005 Report of the 90<sup>th</sup> National Conference on Weights and Measures, Specifications and Tolerances Committee Agenda item 320-1 in NCWM Publication 16 for additional background information and the proposed software identification language considered by the S&T Committee.

At the 2005 Annual Meeting of the NCWM, the S&T Committee heard no support for this item in its present form and agreed to withdraw the item from its agenda. The S&T Committee encouraged the regional Weights and Measures Associations, and associations of device manufacturers to develop and resubmit a new proposal if they think it is appropriate.

Additionally, the NCWM Board of Directors agreed to establish an NTETC Software Sector. That Sector will tentatively meet in April 2006. The charge of the Software Sector is to:

- Develop a clear understanding of the use of software for the operation of today's weighing and measuring instruments. This first step is important to permit the direction of the efforts mentioned in the next steps.
- Develop Handbook 44 specifications as needed to provide appropriate requirements for software incorporated into weighing and measuring devices and adequate tools for field verification and enforcement of such devices to include security requirements, simple identification means, etc.
- Revise existing or develop new Publication 14 checklists to provide NTEP laboratories the capability of identifying and certifying software or software components as being metrologically compliant with Handbook 44 requirements including, but not limited to its functions, marking, and security.
- Consider the development of guidelines for and promote training of weights and measures officials in proper application of Handbook 44 in verifying software as compliant and traceable to a NTEP Certificate of Conformance (CC).

Individuals interested in participating as members of the Software Sector were requested to contact Jim Truex, NTEP Committee Chairman.

**Discussion:** The Weighing Sector reviewed the background information and heard comments from Don Onwiler, NCWM Chairman, that the first meeting of the Software Sector will be held in conjunction with the 2006 meeting of the NTEP Participating Laboratories. The NTEP Committee has requested volunteers to participate in the Sector, including people who are experienced in developing metrological software. WMD recommended that the Software Sector consider soliciting input from foreign metrological regulatory agencies that have experience with regulating metrological software used in weighing and measuring devices and other U.S. Government Agencies that have experience in verifying the performance and security of software. Mettler Toledo reported that they have had some contact with the Western European Legal Metrology Cooperation (WELMEC) and experience with WELMEC Guide 2.3. Guide for Examining Software (Weighing Instruments). A copy of the WELMEC publication can be downloaded from their website at [www.welmec.org/publications/2-3.pdf](http://www.welmec.org/publications/2-3.pdf). The NTEP Director also suggested investigating the existence of software standards written by other U.S. standards writing organizations (e.g., ANSI) and that any volunteers to the Sector be willing to actively participating in the Sector and be committed to following through with assigned tasks.

**Recommendation:** The NIST Technical Advisor included this item on the agenda only to provide the Weighing Sector with an update the status of the S&T Committee Agenda item 320-1 in NCWM Publication 16 Identification: Built-for-Purpose Software-based Devices and recommends no further action on this item since it was withdrawn from the S&T Committee agenda.

### 3. S.1.1.c. Zero Indication (Marking Requirements)

**Source:** 2004 Weighing Sector Agenda Item 4 - S.1.1. (c). Zero Indication (Marking Requirements).

**Background:** See the 2005 Report of the 90<sup>th</sup> National Conference on Weights and Measures, Specifications and Tolerances Committee Report, the 2003 NTETC Weighing Sector Meeting Summary agenda item 19, and the 2005 NCWM Publication 16 S&T Committee Report Item 320-1 for additional background information on the proposal to clarify marking requirements for scales that display unloaded scale conditions with other than digital zero indications.

During the 2004 NCWM Interim Meeting, the S&T Committee was briefed on some ongoing discussions about zero indications within the Weighing Sector for the past several years. The Committee agreed that its interpretation of paragraph S.1.1. (c) is consistent with the original intent of the 78th NCWM Report of the Specifications and Tolerances Committee. The Committee agreed that additional language is needed to clarify that no marking is required if operator intervention is necessary to verify a zero condition before the start of a transaction. The Committee believed this will provide a record of how the requirement should be applied and proposed changes to paragraph S.1.1. (c) to clarify that no marking is required if operator intervention is necessary to verify a zero condition before the start of a transaction.

At the 2005 Annual Meeting of the NCWM, the S&T Committee changed the status of the item from "voting" to "information" to allow additional time to assess whether or not the markings could be displayed as part of the indication rather than being physically marked on the device and to gather more information on whether or not self-service systems are providing the necessary information about the zero-load condition of the scale prior to each weight determination.

**Discussion:** A couple of the scale manufacturers provided weighing instruments during the meeting and demonstrated how they operate with in the current requirements of S.1.1.(c). The purpose of the demonstration was to see the operation; have the opportunity to operate the scale; help other members of the Sector to understand the issue better; and show that the units have “an effective automatic means...” to satisfy the requirement without additional labels or markings.

NIST WMD restated that they continue to support the language recommended in the S&T Committee’s agenda item 320-1 that clarifies the intent of the 78<sup>th</sup> NCWM S&T Committee. Furthermore, parties that disagree with the 2004 Committee’s interpretation and oppose the proposed language in 320-1 should develop an alternate proposal to clarify that additional markings **are not required** for devices that have “an effective automatic means” to inhibit a weighing operation or return the device to a continuous digital indication when the scale is in an out-of-balance condition.

Mettler Toledo stated that they continue to oppose the proposed language to amend Scales Code paragraph S.1.1. (c). since effective means are provided to inhibit a weighing operation when zero indications are indicated by other than a digital zero when the scale is in an out-of-balance condition. That is, the scale will not go into a “sleep” mode if there scale is not at zero and will return to an active weight display if the scale senses that the scale is no longer at zero. In situations where the scale display turns off with the scale in an out-of-balance condition, operator intervention is required to turn on the scale, in which case the scale will automatically be rezeroed or indicate an error condition.

Mettler Toledo further stated that their position is based on the language in NIST Handbook 44. WMD responded that the proposal is intended to clearly state the position of the 78<sup>th</sup> NCWM S&T Committee in NIST Handbook 44.

Other manufacturers supported the Mettler Toledo position and discussed other methods that provide effective means to inhibit weighing transactions and display other than digital zero indications such as center-of-zero annunciators, RFID (radio frequency identification device) would reactivate the scale displays when the product is in close proximity to the scale, touch screen display scale activation that would automatically activate when the scale was in an out-of-balance condition, weight displays visible to the operator when the customer display indicates promotions or other non weight information.

The Maryland NTEP laboratory and NIST WMD stated that the proposed language represents what is already covered by NTEP evaluation and test criteria. The problem is that field officials do not know if or when additional markings are required, and that customers need the zero information (either by a digital zero or other indication that the scale is at zero) along with the weight, and pricing information in a computing type device, in order to make an informed decision on whether or not to accept the weight (and total price) determination.

The Ohio NTEP laboratory disagreed with the WMD and Maryland positions and reported that they have not heard of any problems by field officials and that they have received no customer complaints on this subject.

Additional comments were made that supported the Ohio position and that customers do not look at the zero condition of the scale and that they are only concerned about the price they have to pay. WMD and Maryland responded that the Sector should not be making that assumption and that there are customers that want to make sure that the scale starts at zero in order to receive an accurate transaction.

**Recommendation:** The discussion was concluded since there was no clear consensus on a position that the Sector could report to the NCWM S&T Committee on the agenda item. The Sector Chairman held two votes on this subject. The results of the vote will be forwarded to the NCWM S&T Committee.

The first vote was to determine if the Sector agreed with the proposal on the NCWM S&T agenda to amend Handbook 44 paragraph S.1.1. (c) to clarify that additional markings **are required** for devices that have an effective automatic means to inhibit a weighing operation or return the device to a continuous digital indication when the scale is in an out-of-balance condition. Two Sector members voted to support the S&T Committee proposal and eleven Sector members voted against supporting the proposal.

The second vote was to establish a Sector position that states that additional markings **should not be not required during type evaluation** on devices that have an effective automatic means to inhibit a weighing operation, or return the device to a continuous digital indication when the scale is in an out-of-balance condition. The results of the



**second vote: two Sector members voted to oppose this position and twelve Sector members voted to support this position.**

**The result of the second vote means that such markings would not be required during type evaluation. It should be noted that WMD continues to believe that field officials may require such markings citing General Code paragraph G-S.6. Marking Operational Controls, Indications, and Features and the interpretation of the 78<sup>th</sup> NCWM S&T Committee unless Scales Code paragraph S.1.1. (c). is amended to clearly state that no additional markings are required when a device, where zero is indicated by other than a continuous digital zero, has effective means to inhibit a weighing transaction when the scale is in an out-of-balance condition.**

#### **4. Bench/Counter Scale Shift Test and Definitions**

**Source:** NIST WMD

**Background:** See the 2004 NTETC Weighing Sector Meeting Summary agenda item 5 and the 2005 NCWM Publication 16 S&T Committee Report agenda item 320-6 for additional background information.

At the 2005 Annual Meeting of the NCWM, the S&T Committee agreed with the Scale Manufacturers Association to modify Figure 2, test positions for test loads located in the corners of the scale platform but kept the proposal as an information item to enable weights and measures officials and the NTEP Laboratories to continue forwarding data on the proposed and current shift test to the NIST Technical Advisor.

**Discussion/Recommendation:** WMD has received limited data from one state and no data from the NTEP laboratories. WMD requests that any data from the participating NTEP laboratories be submitted by November 1, 2005, in order that the results can be compiled and presented to the S&T Committee during the January 2006 NCWM Interim Meeting.

**Jim Truex, Chief Ohio Department of Agriculture Weights and Measures, reported that their field officials and the Ohio NTEP laboratory have collected data, and the data will be submitted to WMD by November 1, 2005. Jim added that preliminary results indicate that they have not found any significant problems.**

**There is no action required by the Sector at this time.**

#### **5. Publication 14 Force Transducer (Load Cell) Family and Selection Criteria**

**Source:** NTEP Committee Technical Advisor

**Background:** See the 2004 NTETC Weighing Sector Meeting Summary agenda item 11 for additional background information regarding a recommendation to amend the family selection criteria for load cells to be listed on an NTEP Certificate of Conformance.

During its 2004 Meeting, the Weighing Sector agreed to assign a work group (Stephen Patoray (NTEP), Steven Cook (NIST), the NIST Force Group, Joseph Antkowiak (Flintec), Frank Rusk (Coti), and the California NTEP laboratory) to complete the following tasks:

1. Develop the definition of a family, determine load cell selection criteria, and develop an example of a load cell selection for the 2005 NCWM Interim Meeting.
2. Review and adapt OIML R 60 language developed by John Elengo for incorporation into Publication 14 for the 2005 meeting of the Weighing Sector.

**Discussion:** Stephen Patoray, NTEP Director, updated the Sector on the status of the project. He described a proposal that has been forwarded to the small work group. In summary, the proposal has the potential for an applicant to submit only one load cell for a basic load cell family to be covered on an NTEP CC. However, taking into consideration possible groups within the family (e.g., material construction, methods of mounting, strain gauge bonding, output rating, input impedance, supply voltage, cable details, etc.), there will be no significant difference in the number of load cells that have to be submitted for evaluation.

One of the questions that must be addressed in any proposed change to the selection criteria is how the criteria will affect applications to amend and expand existing CC.

**Recommendation:** The Sector agreed that no actions are required by the Sector at this time since the work group has not finalized a specific proposal to modify load cell selection criteria.

## **6. Compatibility of Indicators Interfaced with Weighing and Measuring Elements**

**Source:** NTETC Measuring Sector and NCWM S&T Committee

**Background:** This issues proposed to change what requirements and evaluation criteria must be met to interface an indicating element and a weighing or measuring element that have not been previously evaluated together on a single NTEP CC, but which have their own NTEP CC listing compatible communication specifications. See the 2004 Report of the 89<sup>th</sup> NCWM, Specifications and Tolerances (S&T) Committee Agenda Item 310-2 and the 2004 NTETC Weighing Sector Meeting Summary Agenda Item 12 for additional background information.

At its 2004 meeting, the Weighing Sector stated that the proposal as written is not appropriate for weighing devices since the language could require all combinations of devices and communications to be evaluated. The Weighing Sector agrees with the Measuring Sector that this is not the intent of the proposed language. The NCWM S&T Committee decided to withdraw Item 310-2 from the S&T Committee Agenda until it is further developed and resubmitted with the support of the NTETC Weighing and Measuring Sectors.

The Sector supported a joint meeting of the NTETC Weighing and Measuring Sector members attending the 2004 Southern Weights and Measures Technical Conference (SWMA). The Weighing Sector agreed that, if both the Weighing and the Measuring Sectors could agree on the issues and proposal, then the proposed language could be proposed to the NCWM S&T Committee for placement in the General Code; otherwise, any proposed language should be proposed for inclusion in the specific codes. If there were no agreement between the Weighing and Measuring Sectors, the Measuring Sector could request a separate work group to develop a proposal to address the compatibility of multiple elements issue for the NIST Handbook 44 Liquid-Measuring Devices Codes.

At its 2004 meeting, the Measuring Sector generally agreed that the language added to Publication 14 in a new Section T. Testing Required To Interface Components With Individual CC's That Were Not Previously Tested Together was sufficient to address the original concerns of manufacturers regarding when additional testing is necessary to determine compatibility between components. The Measuring Sector did not propose any new language for Handbook 44 to be submitted to the NCWM S&T Committee for consideration. The Sector agreed that the item should be dropped from the Measuring Sector's Agenda. As a result of the Measuring Sector's conclusion, for a joint discussion between the Weighing and Measuring Sectors to develop a proposal to address the compatibility of multiple elements was no longer necessary.

**Discussion/Recommendation:** The NIST Technical advisor has received no additional input on this item and recommended that it be withdrawn from the Weighing Sector's agenda until a proposal has been developed to address the apportionment of errors for separable weighing, load-receiving, and indicating elements. The proposal should also include testing and reporting the minimum sensitivity of indicating elements (i.e., smallest voltage per scale division). It should also be noted that the proposed revision of OIML R 76 for Non-automatic Weighing Instruments includes recommendations for the apportionment of errors and a proposed Annex E for checking the compatibility of modules of non-automatic weighing instruments. The OIML definition for the term "module" is nearly identical to the Handbook 44 definition of "element".

The Weighing Sector agreed that the compatibility of weighing modules is not clearly defined in NIST Handbook 44 and NCWM Publication 14 evaluation and test criteria for digital electronic scales and that any proposal to define such criteria would be a major project.

The Sector recommends no further action on this item and that it be removed from future agendas unless a specific proposal to establish criteria for determining the compatibility of weighing, indicating, and other elements has been developed.



## **7. Handbook 44 Computing Scales Interfaced with an Electronic Cash Register**

**Background:** See the 2005 Reports for the 90<sup>th</sup> National Conference on Weights and Measures, Specifications and Tolerances Committee Agenda item 320-3 and the 2004 NTETC Weighing Sector Meeting Summary agenda item 13 for additional background information on a proposal to amend NIST Handbook 44 that would list specific requirements for electronic cash registers that are interfaced with scales.

At its 2004 meeting, the Weighing Sector agreed not to recommend a proposal to NIST Handbook 44 to add new device-specific code requirements to the Scales Code to address the proper interface of computing scales with electronic cash registers (ECR). The Sector generally agreed that there are currently appropriate means in Handbook 44, including General Code paragraphs G-S.5. Indicating and Recording Elements and G-S.2. Facilitation of Fraud, and the examination procedure outlines to address the proper interface of computing scales with ECRs during field evaluation.

At the 2005 NCWM Annual Meeting, the S&T Committee expressed concerns that the proposal is not fully developed for multiple reasons.

- Manufacturers indicate the proposed subparagraphs are too restrictive when a point-of-sale system reads UPC codes and recomputes prices for frequent shopper discounted prices.
- The Committee heard comments that NTEP verifies the requirement in the proposed new paragraph (d) to ensure that the electronic cash register does not have any input to the computing scale in the process of determining the total price of a weighed item. However, the Committee believes that the term “input” should be expanded to clarify the requirement for field officials.
- The proposal does not address computing scales with multiple sales accumulation capability.
- Further work is also required to make certain that an examination procedure outline is available to provide field procedures for use in determining that the interface complies with the requirement.
- The current definition of point-of-sale system (POS) may also require some modification to clarify the specific type of weighing element that is permitted as part of the POS assembly.

The Committee also heard that there are instances in which a computing scale may be inappropriately interfaced with an ECR to create a point-of-sale system contrary to the intended device application covered on the device’s CC. The Committee believes this becomes a design issue rather than one involving the user; however, a user requirement might also be appropriate. Because of these questions and unresolved issues, the Committee changed the item status from “voting” to “information” and recommends the original submitter rework the proposal as a specification that (1) provides more detail to the field official about how the cash register must function, and (2) is readily available in NIST Handbook 44 to assist device manufacturers who are considering design modifications to a computing scale or cash register. The Committee also asked the SWMA to determine if a user requirement is needed as a companion paragraph to a device specification, and review any proposed language to ensure there are no conflicts with requirements in related paragraphs such as S.1.8.4. Recorded Representations, Point-of-Sale Systems.

**Discussion:** The NIST technical advisor recommended no action on this item pending further action and work by the original submitter. It was reported the Western Weights and Measures Association at their 2005 Technical Conference recommended that this item be withdrawn from the NCWM S&T Committee agenda. The Central Weights and Measures Association (CWMA) also reported that there were no comments on this item and that they did not provide the S&T Committee with a recommendation during the 2005 CWMA Technical Conference Interim Meeting.

The Maryland NTEP laboratory stated that weights and measures officials are not uniformly applying existing requirements since it is easy to miss language that is located in multiple places in Handbook 44 and that the proposal to amend NIST Handbook 44 is being modified.

**Recommendation:** The Sector recommends no action on this item and that it not be placed on the 2006 Sector agenda as a carryover item.

## 8. Publication 14 - New Items in Computing Scale Section

**Source:** Maryland Participating Laboratory

**Background:** See the 2004 NTETC Weighing Sector Meeting Summary agenda item 16 for additional background information regarding the display of product code information in the total price display on a computing scale.

The Maryland NTEP laboratory reported on a computing scale (see picture below) that used the “Total Price” display to indicate the product code prior to a load being placed on the scale and a calculation of total price. They reported that the product code (PLU) is indicated by illuminating all “□” segments and turning off the decimal point in the “Total Price” portion of the display. This PLU indication in this example may cause a customer to believe that the PLU number is the total price to pay if a load was already on the platform and the product code was entered.



Many of the sector members did not believe the above example provided by the Maryland laboratory was a problem since the product code did not use a decimal point similar to a representation of money.

The 2004 Weighing Sector concluded that the example provided by the Maryland NTEP laboratory did not demonstrate that there is a problem and that the proposed language may cause additional confusion. The Maryland NTEP Lab was requested to further develop the language and submit such to the Sector for discussion and ballot approval.

**Discussion:** The Maryland NTEP laboratory updated the Sector on the status of their proposal. The NTEP laboratories and manufacturers stated that any language proposed for NIST Handbook 44 and/or NCWM Publication 14 should address the following:

- Price computing scales with Weight, Unit Price, and Total Price information displayed from top to bottom,
- Total Price information should be located on the right for horizontal layouts,
- New products are likely to have panel type liquid crystal or matrix displays that can be configured in multiple or customer designed formats,
- Once the Unit Price is displayed on the scale, the PLU should be replaced by the Total Price (the example above example indicated both a Unit Price with the PLU number in the Total Price position),
- Weight and pricing information, regardless of the order it is presented should be adequately identified and easily read, and
- Product code or other information should not interfere with the weight display

Some of the manufacturers noted that transactions frequently happen too fast for a customer to understand what is happening during the weighing and pricing procedures and only pay attention to the Total Price. The NIST technical advisor responded that the Sector should not be making that assumption that all customers do not look at or care about the net weight and unit price information.

A few of the Sector members noted that the example shown above could be confusing to the customer if the PLU number has three or more digits. Other Sector members replied that the leading digital zeros in the above example are not permitted to be part of the “Total Price” to pay. The NTEP Director questioned whether this prohibition is in Publication 14 or Handbook 44.

**Recommendation:** There was no consensus on a recommendation for this item among the voting and non voting members of the Sector. The Sector Chairman took a vote of the voting members to determine if the Sector believed there was a problem with the language on the format of the displays on price computing scales in NCWM Publication 14. The Sector voted 15 (agreed) to 1 (disagree) that no language is needed to address the format of price computing scale displays.

Gary Lameris volunteered to review NIST Handbook 44 Scales Code and NCWM Publication 14 to determine if language is needed to address “other than weight information” that may be indicated in the weight display. Any recommendations will be forwarded to the participating laboratories at their 2006 spring meeting and to the 2006 NTETC Weighing Sector Meeting.

## 9. CLC Type Evaluation Tests on Railway Track/Vehicle Scales – Technical Policy

**Source:** Brechbuhler Scales Inc.

**Background:** At its 2004 meeting, the Weighing Sector could not reach a consensus on the request that vehicle weighing applications ( $e = 20$  lb) be added to existing railway track scale CCs ( $e = 50$  lb) that have been designed to Cooper E-80 standards and tested using the GISPA test car (or other railroad test cars and additional test weights).

Brechbuhler Scales stated that they would develop and submit a proposal for testing for railroad track scales that would include procedures to include highway vehicle applications with  $d = 20$  lb on CC for railway track scales that were evaluated with  $d = 50$  lb without additional testing for consideration at the 2005 meeting of the Weighing Sector.

Publication 14 Technical Policy Section 8 paragraph “c.” states that a CC will apply to all models that have scale division values equal to or greater than the value of the scale division used in the scale that was evaluated. Brechbuhler Scales recommends that the technical policy in 8.c. should not apply to combination railway track/vehicle scales that already have an active CC for weighing railway track cars. That is, the CC for a railway track scale with  $d = 50$  lb can include vehicle-weighing weighing application with  $d = 20$  lb without additional testing provided that the GISPA test car, or suitable field standard weight carts are used for the evaluation of the railway track scale. The recommendation for amending the technical policy for modular combination railway track/vehicle scales is included in the 2<sup>nd</sup> recommendation to Agenda Item 14, CLC for Combination Railway Track/Vehicle Scales.

**Discussion:** The NTEP Director requested clarification on whether this agenda item is intended to address the issue of what is required to be tested for new device types or if the issue is to address what can be covered on existing certificates. If a device is tested with  $d = 50$  lb, the certificate cannot cover scales with  $d = 20$  lb without additional testing. Additionally, the performance and permanence tests for vehicles are different than the performance and permanence test for railway track scales. A railway track scale permanence test does not meet the requirements of the vehicle scale permanence test. The NIST technical advisor stated that the subject of agenda item 11 is intended to draft language for the permanence and performance testing the style that has been drafted for vehicle scales and other large capacity scales. There will be remaining differences in the number of test loads for the increasing/decreasing load tests and the amount of test weights and test loads needed for each test.

Brechbuhler Scales stated that it would be best to test the scale with a multiple range indicating element where  $d = 20$  lb in the weighing range of typical vehicle weights and with  $d = 50$  lb in the weighing range for railway cars.

Many of the NTEP laboratories remain concerned that vehicles on combination railway track/vehicle scale applications do not roll on to the scale in the same path as railroad cars since vehicles can drive on either the right or left side of the railroad car traffic pattern. Compliance with loading along the sides of the scale that simulates vehicle traffic (wandering loads from side to side) should be verified during an NTEP evaluation. Additionally, testing at weights in the vehicle

weighing range and railway car weighing range should also be performed at the same time since span calibrations at the lower weighing range does not guarantee accuracy at the higher range, or vice versa.

The NTEP Director stated that there is no well-defined test procedure or technical policies in NCWM Publication 14 for combination railway track/vehicle scale NTEP evaluations and recommends that such language be developed. The Ohio NTEP laboratory supports such a project. Other comments included that the procedures should include discussions about Cooper E 80 design requirements.

Another NTEP laboratory cautioned that some of the Cooper E 80 requirements are not suitable for NTEP evaluation and subsequent verification by field officials such as approaches to railway track scales. NTEP evaluations should be limited verifying the compliance with the metrological and installation requirements in NIST Handbook 44. A manufacturer also recommended that the NTEP application form include a space for an applicant to request the vehicle weighing option on the railway track scale application.

**Recommendation:** The Sector agreed that NCWM Publication 14 Technical Policies and Test Criteria for vehicle scales and railway scales should be reviewed and that separate test criteria should be developed for combination vehicle/railway track scales. The new criteria should include technical policies and test procedures for:

- 1) New NTEP applications,
- 2) Amendments to existing CCs for railway track scales to include the vehicle weighing feature including;
  - a. CLC ratings,
  - b. CLC testing using field standard weight (center vs. off-center),
  - c. Permanence tests for amending railway track CCs to include vehicle weighing option, and
- 3) Test using the vehicle scale  $e_{\min}$  for new NTEP applications and existing CCs.

Ed Luthy agreed to develop a draft proposal and distribute it for review and comment to Stephan Langford, Darrell Flocken, and Bob Feezor. Develop procedures and technical policies are due to the NIST Technical Advisor by March 1, 2006, in order that the proposal can be reviewed by the NTEP laboratories prior to it being submitted to the NTETC Weighing Sector for their September 2006 meeting.

## 10. Tare on Multiple Range Scales

**Source:** NTEP Participating Laboratories:

**Background:** See the 2004 NTETC Weighing Sector Meeting Summary agenda item 22 for additional background information on the discussion for the rounding of tare on single and multiple range, and multi-interval scales.

The NIST Technical Advisor requested clarification on the rounding of tare on multiple range scales from the Secretariat to OIML R 76 as part of the U.S. comments to the Working Draft (WD) revision of R 76. The Secretariat responded by including several examples of tare rounding for single and multiple range scales with both tare weighing (pushbutton tare) and preset tare (keyboard tare) in the 1<sup>st</sup> Committee Draft (1 CD) revision. To summarize the examples, tare must be round to the nearest division of the higher weighing range when the gross weight goes to the higher weighing range. However, the Secretariat did not include examples where the tare would round to zero when the gross weight entered a higher range. The United States followed up on this question in their comments on the 1 CD in April 2005. The Secretariat will address this question in the 2<sup>nd</sup> Committee Draft (2 CD), which will be distributed in October 2005.

The Sector was requested to:

- (1) Discuss the rounding up of tare for multiple range and multi-interval scales in NCWM Publication 14 section 31 and 32. The rounding up of tare conflicts with NIST Handbook 44 General Code paragraph G-S.5.2.2. (c), which requires that digital values round off to the nearest minimum unit that can be indicated or recorded, and Publication 14 section 48.2.2., which requires that keyboard tare weight entries be rounded to the nearest displayed scale division.
- (2) Review the of examples of tare rounding from the 1 CD of the revision to OIML R 76 for possible inclusion into Publication 14 once the revision to R 76 has been completed.

**Discussion:** The Sector reviewed the examples of tare rounding from the 1<sup>st</sup> Draft Revision of OIML R 76. The examples indicated that in the examples where tare was determined by actual weighing, tare and gross weights could be taken to the internal resolution of the scale and that the rounding after the net weight was calculated from the internal resolution of the gross and tare weights and that printed tare values could be off by 1 e. Other examples showed that the net weight, calculated as the difference between gross and tare weights) could have a least significant digit that was not the same as the weighing range of the net weight.

The Sector also reviewed the NCWM Publication 14 paragraphs that discuss the rounding of tare. There were several points made on the rounding of tare including:

- Always rounding tare in the upward direction always benefits the customer to the detriment of the scale seller.
- Tare rounding procedures should be clear and well documented in NIST Handbook 44 and NCWM Publication 14 for consistent type evaluations and field enforcement activities.
- Past Sector discussions concluded that tare would round up in to facilitate compliance with NIST Handbook 130 Model Uniform Weights and Measures Law Section 15. Misrepresentation of Quantity which states that no person shall sell, offer, or expose for sale a quantity less than the quantity represented....
- A proposal has been submitted to the 2005 Southern Weights and Measures Association Specifications and Tolerance Committee to require that tare always rounds up. It is intended for the seller to include the cost of the packaging in the price of the product as opposed to paying the same unit price for the package as the product.
- Some states disagree that rounding to the nearest scale division is in violation with Uniform Weights and Measures Law
- NCWM Publication 14 tare rounding requirements for multi-interval and multiple range scales is in conflict with NIST Handbook 44 General Code paragraph G-S.5.2.2. (c).
- Handbook 44 does not support the Publication 14 requirement that zero tare entries are not permitted.
- Rounding tare to zero when the gross weight goes to the next segment or range in multi-interval or multiple range scales should not be allowed.
- Why does Publication 14 specify different methods for rounding tare between single range and multi-interval, multiple range scales?

**Recommendation:** The Sector voted 13 to 4 to modify Publication 14 to make tare rounding consistent with Handbook 44 General Code paragraph G-S.5.2.2.(c) Digital Indication and Representation for multi-interval and multiple range scales. The NIST Technical Advisor will work on develop amendments to Publication 14 sections 31, 32, and 45-51 for Tare and other possible sections that will consistently apply the rounding of tare throughout the digital electronic scales checklist. The Sector will then be balloted on the proposed modifications to Tare in Publication 14.

The Sector also agreed to consider the OIML R 76 examples of tare rounding at a later date once the revision of the R 76 has been completed.

**NIST Technical Advisor Note:** During the development of the letter ballot language, it was noted that there were some items (e.g., tare annunciators and terminology) that requires further discussion by the Sector. Additionally, there is a developing (D) item in the 2006 NCWM S&T Interim Agenda that may have an impact on the Sector recommendation. An alternate proposal was also developed that would address the operation of the “tare entered” annunciators, examples demonstrating tare rounding in different scenarios, and add definitions clarifying the differences between semi-automatic tare and preset tare. Based on these concerns, the NIST Technical Advisor does not believe that the language to amend Publication 14 is sufficiently developed to be submitted to the Sector as a letter ballot.

The NIST Technical Advisor consulted with the NCWM Chairman, NTEP Committee Chairman, Sector Chairman, and NCWM Technical Advisor on both proposals to amend Publication 14 tare requirements. As a result, it is recommended that a small work group review the proposals, review tare operation and requirements in general, and make recommendations on how this is applied to single range, multiple range and multi-interval scale operation. The work group should develop a recommendation(s) for changes to Handbook 44 and Handbook 130 (if necessary), and provide the Weighing Sector guidance on checklist requirements. It is anticipated that the group could perform the tasks through the use of e-mail correspondences and conference calls.

## 11. Performance and Permanence Tests for Railway Track Scales Used to Weigh Statically

**Source:** NTEP Participating Laboratories

**Background:** See the 2004 NTETC Weighing Sector Meeting Summary agenda item 23 for additional background information on performance test criteria, permanence test requirements, and application of tolerances for railway track scales. At the 2004 meeting of the Weighing Sector, the NIST technical advisor and Ed Luthy (Brechtbuhler Scales) volunteered to submit this issue at the October 2004 meeting of American Railway Engineering and Maintenance of Way Association (AREMA) Committee 34-Scales.

AREMA Committee 34 responded with the following statements to comments and questions from the summary of the 2004 meeting of the Weighing Sector.

1. The railroads agree that, when conducting NTEP testing of railroad scales, acceptance tolerances must be applied regardless of the interval between the initial test and the permanence test.
2. The railroads do not agree that there is a poor “As Found” compliance rate *when railroad track scales are designed and installed per the requirements of the AAR Scale Handbook*.
3. NCWM Publication 14 (DES-109 68.7 Permanence Test) allows the permanence test to be conducted with alternative test weights, such as railroad scale test cars. With sufficient coordination between GIPSA and the railroad upon which the scale is located, delays should be minimal and controllable.
4. The railroads do not agree with removing permanence testing from the NTEP test. This is an important part of the NTEP process.

GIPSA has also provided some additional comments regarding permanence testing on railroad track scale NTEP evaluations. GIPSA recommended that new installations should be set up and calibrated using a railroad test car after GIPSA inspects the installation for compliance with railroad bridge specifications; and then the scale should be subjected to a “break-in” period of a month or two. GIPSA would then come in and perform the initial NTEP test. GIPSA would come back as soon as possible, but no sooner than 20 or 30 days following the initial NTEP test and do the final test for permanence; the scale would be held to acceptance tolerances. If GIPSA can't get back for some reason, a single 100 000 lb (minimum) railroad scale test car or two 80 000 lb cars with current NIST traceable calibrations can be used for the permanence test.

**Discussion:** The Sector reviewed a proposal to amend the 2005 Edition of Publication 14, Section 69. Performance and Permanence Tests for Railway Track Scales Used to Weigh Statically submitted by the NIST technical advisor based upon the comments of the 2004 Weighing Sector, GIPSA, and AREMA Committee-34.

The Sector also reviewed additional comments dated September 23, 2005, from Ron Mueller, stating that the Canadian National Railway does not agree with GIPSA's recommendations concerning Performance and Permanence Tests for



Railway Track Scales Used to Weigh Statically and that NTEP should initially approve all new types of devices. The reasons for the Canadian National Railway's position are that many railroads will not be willing to oversee installation or evaluate railway track scale design and that the length of minimum and maximum time for the recommended break-in period prior to the start of the official NTEP testing is too subjective and not adequately defined. Ron Mueller also stated that the task of type approving a weighing device is, and should remain, that of NIST, NTEP, and GIPSA combined.

Ron Mueller stated that NIST, NTEP, and GIPSA have relied on the servicing railroads to do engineering tasks assigned for their approval procedures and suggested that an independent organization with the expertise and desire to inspect and evaluate these design criteria be allowed to perform this task (e.g., Mr. Ronald W. Kaye, Senior Transportation Engineer, Patric Engineering, Joliet, Illinois at (630) 795-7265). The cost for such design and engineering approval could become part of the NTEP process. He further added that no consideration should be given to performing a type approval of a railway track scale at a manufacturer's site."

Robert Feezor, Norfolk Southern Corporation, amended the language submitted by the NIST Technical Advisor based on comments from the Canadian National Railway and submitted it for review by the Sector. The Sector reviewed the proposal as amended by Bob Feezor and discussed the possible use of 80 000 lb field standard weight carts where and additional 20 000 lb could safely be added to the weight carts for the tests. Additionally, the Sector discussed the permanence test language that permitted one or more railroad test cars to be used for the permanence test in lieu of the GIPSA type weight cart. The railroads believe that the length of suitable railroad test cars precludes using two cars on a single scale and that it is unlikely that two railroad test cars would be available for the tests. Other Sector members believed that it would be acceptable to use any combination of field standards, field standard weight carts, and railroad test cars to perform the permanence test.

**Recommendation:** The Sector agreed to amend the language developed by the NIST technical advisor as recommended by Bob Feezor with additional changes recommended by the Sector. The modified proposal with Sector comments were forwarded to AREMA Committee-34 for their October 24 - 24, 2005, meeting. The modified proposed language and comments from AREMA Committee-34 were then be forwarded to the Sector for a vote on the final language that will be recommended for incorporation into the 2006 Edition of Publication 14.

**Technical Advisor's Note:** *The following is a summary of AREMA Committee 34 suggestions from their October 2005 meeting to modify to the Sector's recommendation.*

**Delete the language that allows permanence testing at the applicant's manufacturing site.**

- Justification: It is unlikely that the applicant's manufacturing facility will have a suitable on-site location and loads at their site. The railroads are concerned that a manufacturer's site may not represent typical customer installations where the scale design and various aspects of the installation are evaluated and approved by the serving railroad prior to the railroads accepting weights from the scale. Additionally, the loads may not represent actual usage when railcars are not used for the weighing operations.

**Change the minimum number of weighing operations from 300 to 150.**

- Justification: Unlike in-motion scales, some static railway track scale installations may only have 3 to 5 weighing operations per day. At that rate, it could easily take a year or longer between tests. Even with the minimum 150 weighing operations recommended by the railroads it would take 30 to 50 days to complete the minimum number of weighing operations. The railroads added that it could cost at least \$6,000 or more to perform additional weighing operations that were not part of an installations normal operation.

**2) Change the minimum time to conduct the permanence test after the initial test from 20 days to 30 days. Note that this does not agree with the Sector recommendation.**

- Justification: The railroads believe that 20 days is too short a time between that initial and subsequent test for permanence even at a high volume test site. Adding the extra time provides the railroads with additional assurance that the scale can perform within tolerance between normal subsequent tests.

**Technical Advisor's Note:** *The proposed language and comments from AREMA Committee-34 were then forwarded to the Sector for a vote on the final language that will be recommended for incorporation into the 2006 Edition of Publication 14.*

*The following information is a summary of the voting results during the balloting process. A copy of this summary, comments on the ballot language, and the amended proposed language were forwarded to the NCWM NTEP Committee for their consideration during the January 22 - 25, 2006, NCWM Interim Meeting in Jacksonville, Florida.*

ITEM NO.	SUB. NO.	ITEM	AFFIRM	NEGAT.	ABST.
1		Approve the 2005 Weighing Sector recommendations to amend NCWM Publication 14 Section 69. Performance and Permanence Tests for Railway Track Scales Used to Weigh Statically.	7 (3 private 4 public)	1 (public)	3 (2 private 1 public)
2		Approve the following additional modifications recommended by the American Association of Railroads AREMA Committee 34.			
	a.	Delete the language that allows permanence testing at the applicant's manufacturing site.	4 (1 private 3 public)	3 (2 private 1 public)	4 (3 private 1 public)
	b.	Change the minimum the number of weighing operations from 300 to 150.	3 ( private)	3 (public)	5 (3 private 2 public)
	c.	Change minimum time to conduct the permanence test after the initial test from 20 days to 30 days.	4 (3 private 1 public)	2 (public)	5 (3 private 2 public)

*Based upon the ballot results and comments received during the balloting process, the language in [Appendix A-Agenda Item 11](#) was amended to delete the language that allows permanence testing at the applicant's manufacturing site, to change the minimum time to conduct the permanence test from 20 days to 30 days, and clarify that 100 000 lb of field standard test weights and/or field standard weight carts are required for the initial test of a railway track scale. Additionally, language is added to clarify that a railroad test car(s) may be used in lieu of, or in conjunction with field standard test weights and/or field standard weight during the permanence test.*

*Additional editorial suggestions are proposed to clarify the documentation required to verify certification of field standards and railway track scale test cars, and clarify term "standard rail car" since the railroads use this term to describe a type of railway scale test equipment.*

## 12. Cash Acceptors or Card-activated Systems

**Source:** NTEP Participating Laboratories

**Background:** At its 2004 meeting, the Weighing Sector recommended cash acceptor checklist language. After the meeting, a device incorporating cash acceptors was submitted for evaluation. During the evaluation, it became evident to the NTEP laboratory evaluator that some items in the recommended checklist were either vague or missing from the proposed Publication 14 language. The items identified by the laboratory were:

- (1) insufficient paper to print a receipt and complete a transaction, and
- (2) insufficient funds to return the correct change or return the correct amount inserted into the machine should a transaction be canceled.

Additional language was proposed by WMD and reviewed by the NTEP Director and the NTEP laboratory that was conducting the evaluation. The *ad hoc* language attempts to ensure that customers receive printed or displayed instructions directing them to contact a store attendant or manager to retrieve correct change or a copy of the transaction information printed on a separate recording element in case of insufficient funds or receipt paper.

During the 2005 NCWM Interim Meeting, the NTEP Committee agreed to add the additional language as *ad hoc* language in the 2005 update of NCWM Publication 14 (below). The NTEP Committee discussed several additional “cash acceptor” issues that may require clarification or additional checklist requirements. The NTEP Committee also requested that this item be presented during the 2005 meeting of the Weighing Sector to address these issues and noted that these items may also need to be addressed in other sections of NCWM Publication 14.

The NTEP Committee asked the Weighing Sector to:

1. Review the procedures and *ad hoc* language in the agenda for addition to Publication 14 Electronic Cash Registers Interfaced with Scales Section 13.
2. Discuss the need for a definition of card-activated and/or cash acceptor systems. Some of the questions that need to be answered include:
  - a) Are they limited to ECR/POS interfaced with scales?
  - b) Are they self-service customer card-activated/cash acceptor systems and does the checklist apply to store clerk card-activated/cash acceptor systems?
3. Discuss other possible scenarios involving cash acceptors and card activated systems that may affect the accuracy of the transaction, including issues such as the ability for the customer to receive sufficient information to make informed decisions about their transaction, and to receive correct change, credits, discounts, and suitable receipts.

The NTEP Participating Laboratories for Weighing Devices reviewed the *ad hoc* language, explored the possibilities of additional cash acceptor problems, and developed Publication 14 language to be recommended to the Weighing Sector. This information has been forwarded to the NTEP Liquid-Measuring Devices (LMD) Participating Laboratories and NTETC Measuring Sector for their review for potential amendments to the Publication 14 LMD Checklist.

**Discussion:** The Weighing Sector reviewed the *ad hoc* modifications to the checklist. It was acknowledged by the Weighing Sector that there are differences between cash and card acceptors interfaced with weighing devices and liquid-measuring devices. For example, cash and card acceptors used in liquid-measuring devices issue receipts with a fixed length so that the device can easily predict when it will run out of paper. Cash and card acceptors interfaced with weighing devices are predominantly used in point-of-sale interfaces with scales where the receipts can significantly vary in length. The cash acceptors at attended locations may also accept cash in large denominations where the customer is provided with a mechanism to receive all of their change. The *ad hoc* language was developed to include these types of applications. Additional applications include self-service vehicle scales where card acceptors are used to initialize the weighing of a vehicle and to issue printed tickets. Several Sector members stated that the current and *ad hoc* language in Publication 14 is sufficient for these applications.

The Weighing Sector also suggested some minor editorial changes to the language including replacing the term “terminated” with “canceled” since the latter term indicated that the transaction was stopped by a conscious decision of the customer as opposed to being automatically stopped by the device.

**Conclusion/Recommendation:** The Weighing Sector recommends that the language to amend NCWM Publication 14 Electronic Cash Registers Interfaced with Scales in [Appendix A-Agenda Item 12](#) be incorporated into the 2006 Edition of NCWM Publication 14

**The Weighing Sector did not recommend new definitions of card-activated and/or cash acceptor systems for NIST Handbook 44.**

### 13. Ranges Covered on the CC for a Railway Track Scale Based on the Device Evaluated

*Source:* 2005 NTEP Committee

**Background:** During the 2005 NCWM Interim Meeting, the NTEP Committee discussed an issue brought forward by a manufacturer regarding the title of Section 8.2 of NCWM Publication 14 Digital Electronic Scales, “Additional Criteria For Vehicle Scales, Railway Track Scales, Combination Vehicle/Railway Track Scales, and Other Platform Scales Greater Than 200 000 lb.” The NTEP Committee reviewed information from the 1998 and 2000 Weighing Sector meetings that indicated that the Sector, during its 2000 meeting, recommended that an NTEP CC would apply to all models having nominal capacities no greater than the capacity of the scale submitted for evaluation. The Sector made no recommendations to change the length criteria from 135 % to 100 % of the scale submitted for evaluation in either the 1998 and 2000 meetings. However, the 2001 edition of Publication 14 included a change to the length criteria that limits the length of the family of scale to that of the device submitted for evaluation. The NTEP Committee instructed the NTEP Director to correct the Publication 14 language to reflect previous decisions of the sectors, identify the changes clearly in Publication 14, and place this item on the agenda for the 2005 meeting of the Weighing Sector for additional comments and recommendations.

The NTEP Participating Laboratories discussed this item during their April 2005 meeting in Columbus Ohio. The laboratories agreed with the changes recommended by the NTEP Committee. Additionally, they agreed that there are two remaining issues should be reviewed to determine if changes are needed to the criteria for (1) the allowable span between sections, and (2) platform widths based upon the device submitted for evaluation).

**Discussion:** The Weighing Sector reviewed issues on this topic in past Sector summaries. Don Onwiler, NTEP Committee, added that the NTEP Committee’s changes to Publication 14 were based on the Sector summaries. The changes did not reflect the Committee’s position on what is to be covered on the certificate for a railway track scale based on the device evaluated. He also stated that NCWM Publication 14 Administrative Policy J.4. Amending a pre-NTEP Certificate was modified based on the NTEP Committee discussion of an appeal that initiated review of the past Sector recommendations.

The Sector also discussed the criteria for the allowable span between sections and platform widths based upon the device submitted for evaluation that were identified by the NTEP Participating Laboratories during their April 2005 meeting. However, no specific language was discussed to amend Publication 14 Section 8.2.

**Recommendation:** The Weighing Sector agreed with the changes approved by the 2005 NTEP Committee regarding the ranges to be covered on a CC. The Sector made no recommendations to amend that language in the 2005 Edition of Publication 14 Section 8.2. and no further action is recommended by the Sector at this time. Future recommendations to amend NCWM Publication 14 Section 8.2 should be submitted to the Sector for consideration.

## New Items

### 14. CLC for Combination Railway Track/Vehicle Scales

*Source:* Mettler Toledo – Scott Davidson

**Background/Discussion:** Mettler Toledo submitted a proposal to amend CLC requirements in section 8.3. by requiring a minimum CLC of 60 000 lb for the vehicle portion of a combination railway track/vehicle scale.

When using higher capacity load cells (e.g., by using load cells with larger mv/V ratings) within an approved load cell family, the manufacturer is forced to increase the CLC to meet 40 % of the summed capacity for two load cells required in NCWM Publication 14 paragraph 8.3.1 b (DES-7). Increasing the CLC requires additional NTEP testing even if the manufacturer does not want to increase the CLC rating, increase the structural strength of the weighbridge, or increase the scale capacities.

The minimum 60 000 lb CLC requirement was derived from NIST Handbook 44 Scales Code Table UR.3.2.1. Span Maximum Load and looking at 3 axles in 8 feet between the extremes of the axles at 17 000 lb per axle. It shows an "r" factor of 1.00. This means that there are 3 axles within a space of 8 ft, for a total of 51 000 lb for the maximum legal weight for a group of 3 axles. This value was rounded to 60 000 lb since many highway enforcement agencies allow a 10 % tolerance to axle-load weights and provides an additional factor for axle groups that exceed legal highway limits.

The  $v_{\min}$  calculations for load cell suitability show that when using higher capacity load cells, the  $v_{\min}$  is required to remain within the necessary values to meet the 20 lb increment size for the family of scales if the vehicle scale portion has a CLC that is no less than 60 000 lb.

**Discussion - Part 1:** The Sector reviewed a proposal from Mettler Toledo that recommended amending Publication 14 Digital Electronic Scales Part B, Section 8.3 Modular Load-Cell Vehicle, Livestock, or Railroad Track Scales, paragraph 8.3.1. (b) and adding a new paragraph 8.3.1. (c).

The Sector also reviewed recommendations from the NIST Technical Advisor for editorial changes to Publication 14 paragraph 8.3.1.(a) that are intended to avoid confusion and to clarify what is meant by structural strength (load cell or weighbridge), capacity (nominal or concentrated load), and family (scale or load cells).

Prior to the Sector meeting, Darrell Flocken, Mettler Toledo, had questioned the origin and purpose of the original language in Publication 14 paragraph 8.3.1.b. He made some inquiries and reported that the language was intended to address the loading of CLC and that it was possibly a cautionary note to prevent overloading of the load cells with a capacity less than 40 % of the CLC. Other Sector members stated that 8.3.1.b. is not needed since the CLC is calculated by the manufacturer based on the maximum load that can be applied by vehicles with tandem axles according to Handbook 44 Table UR. 3.2.1. Span Maximum Load and not load cell capacity. Another Sector member cautioned that paragraph 8.3.1.b. should not be removed until the reason for the existing language is understood.

After the meeting, the NIST Technical Advisor did some additional research in to the origin of the NTEP Technical Policy Section 8 paragraph 8.3.1.b. The language was originally developed and recommended during the June 1990 meeting of the NTETC Weighing Sector under agenda item VIII Criteria for Modular Vehicle Scale Parameters. A letter dated June 21, 1990, from Terry James, Vice-president Engineering Services at Cardinal Scale Manufacturing Company, stated that the "40 % of the sum of the capacity of two load cells" value for the minimum CLC was selected using the 50 000 lb load cell to establish a capacity with some safety factor based on the legal highway tandem axle load of 34 000 lb. The maximum CLC is the rated nominal capacity of the pair of load cells that comprise a section.

**Recommendation Part 1:** The Sector recommends that the language submitted by Mettler Toledo, as amended by the Sector in [Appendix A-Agenda Item 14](#), be incorporated into the 2006 Edition of NCWM 14.

**Discussion/Recommendation Part 2:** Brechbuhler Scales stated that their proposal in Sector Agenda Item 14 part 1 was no longer necessary based on the Sector discussion and recommendation for agenda item 14 part 1. No further action was recommended by the Sector.

## 15. Abbreviations for Carat and Count in Publication 14 Sections 38. and 76.

**Source:** NIST Weights and Measures Division (WMD)

**Background:** WMD is in the process of developing an EPO and inspector's training manual for Class I and Class II precision balances. During this process, WMD reviewed NIST Handbooks 44 and 130, NCWM Publication 14, and several CC as sources for potential examples for metrological criteria such as methods of sealing, units of measurement, identification, and marking requirements that an inspector might find during a field inspection.

Research into the subject revealed that NIST Handbook 44 only recognizes the "c" as an acceptable abbreviation for carat in Section 2.23 Weights paragraph S.4.5. Carat Weights and in Appendix C General Table of Units of Measurement, Units of Mass (page C-17). NIST Handbook 130 Packaging and Labeling Regulations paragraph 6.7.1. Symbols and Abbreviations recognizes the "ct" as an acceptable abbreviation for count.

During the review of NCWM Publication 14, Section 76. List of Acceptable Abbreviations/Symbols, it was noted that the abbreviation “ct” is acceptable for both “carat” and for “count.” This raises the question about Class I or II scales that may have an approved counting feature for prescription filling applications and also the “carat” as a unit of measurement since “ct” is listed in Publication 14 as an exception to the General Tables of W&M, in NIST Handbook 44. Problems would arise if the abbreviation “ct” were to be used on a device with both the “count” and the “carat” unit of measurement. An Internet search for the “abbreviation of carat” indicates that the jewelry industry uses both “c” and “ct” (c or ct = 200 mg) and the term “carat” is synonymous “carat troy.” The abbreviation for “count” is also “ct” according to many dictionaries and Internet searches and was listed as an acceptable abbreviation in NCWM Publication 14 for “carats” and abbreviation for pieces on receipts and labels for items sold by count.

The abbreviation “ct” in Publication 14 was originally intended for scales that could display indications and print labels and receipts for items sold by count. The term “count” and its abbreviation “ct” was not intended to be used on a scale with an operational counting feature since the counting feature was, until 2003, prohibited in NIST Handbook 44.

The Sector was asked to consider amending the NCWM Publication 14 paragraphs 38.3.1. and 38.4., and Section 76. to eliminate any potential confusion between indications of carat weights and count when the carat weight unit and counting feature are enabled on the same scale.

**Discussion:** The NTEP laboratories stated that the abbreviation “ct” carat was not in Handbook 44 when it was recommended as an acceptable abbreviation for both carat and count in NCWM Publication 14. The “ct” abbreviation for carat is commonly used in the jewelry industry and language in Publication 14 paragraph 38.3.2 does not permit the abbreviation to be the same if a scale has both carat units and the counting option.

Some of the manufacturers state that they use the term “pieces” or the abbreviation “pcs” to identify count on their devices. Based on that comment, some of the Sector members suggested that Publication 14 language should encourage the use of this term and its abbreviation in Publication 14, Section 76.

The NTEP Director noted that the abbreviation “ct” for carat is not listed in NIST Handbook 44 and that NCWM Publication 14 allows the “ct” for carat, and that Handbook 44 should support the requirements and policies in Publication 14. Several laboratory members stated that the industry should not be penalized by not allowing the customary business practice of using “ct” as the abbreviation for carat. They felt that it would be obvious to the customer and user since a carat weight will include decimal values whereas a display of count will be in whole numbers.

Measurement Canada stated that their regulations recognize the “ct” for carat and that the “c” for carat is not accepted.

**Recommendation:** The majority of the Sector agreed that “ct” is an acceptable abbreviation for the term carat since: the abbreviation is in common usage by the jewelry industry, “ct” has been listed in NCWM Publication 14 Table 76 List of Acceptable Abbreviations and Symbols since it was developed by the Sector at their December 8, 1992 meeting, “c” is not an acceptable abbreviation for count, and the obvious indication that carats are displayed decimal values and pieces or count are displayed as whole numbers.

The Sector agreed to recommend that the amendments to NCWM Publication 14 submitted by the NIST technical advisor with changes recommended by the Sector in [Appendix A-Agenda Item 15](#) be incorporated in the 2006 edition of Publication 14.

## 16. Performance and Permanence Test for Bench and Counter Scales

**Source:** Ohio NTEP Participating Laboratory

**Background:** The 2002 edition of NCWM Publication 14 Section 62. Performance and Permanence Test for Bench and Counter Scales paragraph 62.9.5. Test Load stated that 50 % of the maximum capacity, not to exceed 500 lb, of the bench or counter scale is to be repeatedly applied to the scale. The phrase “not to exceed 500 lb” was inadvertently omitted from subsequent editions of Publication 14.



The Sector was asked to review amendments to NCWM Publication 14 Section 63., paragraph 63.6.5.1. (Section 62. was renumbered to Section 63. in 2004) to include language that limits the test load to 500 lb for scales with a capacity greater than 1 000 lb.

**Discussion:** Two of the five NTEP laboratories authorized to conduct type evaluations on scales below 2 000 lb (1 000 kg) have the ability to test 2 000 lb scales with 1 000 lb on their repetitive test equipment. The other laboratories test for permanence on these scales with loads not to exceed 500 lb. Measurement Canada's test equipment applies loads not to exceed 250 kg for scales no greater than 2 000 kg. The Sector agreed that any changes to Publication 14 should be compatible with Measurement Canada and NTEP-Canada Mutual Acceptance Program. Many of the manufacturers stated that they believe the severity of the test should be the same for all evaluations of these devices. There were also suggestions that the language should include metric capacities.

**Recommendation:** The Sector voted (12 in favor and 1 opposed) to amend the Ohio proposal and change the "load not to exceed 500 lb" to "load not to exceed 250 kg (550 lb)" and recommended that the amended language [Appendix A-Agenda Item 16](#) be incorporated into the 2006 Edition of NCWM Publication 14.

## 17. Minimum Height of Weight and Units Indications

**Source:** New York NTEP Participating Laboratory

**Background:** The New York NTEP Participating Laboratory reported the height of the indications of weight and the corresponding units of measure on recent several scales submitted for NTEP evaluations are getting smaller and questioned when displays are too small. Neither NIST Handbook 44 nor NCWM Publication 14 have requirements or suggestions for the evaluation of these displays. New York submitted an example of a scale with a unit of measure display that is 4 mm (incorrectly reported as 2 mm in the Sector agenda) in height.

The Weighing Sector discussed a similar item in 1999 submitted a proposal to add language to the General Code that would establish a minimum height requirement for primary measurement indication to the customer (see the 2000 85<sup>th</sup> NCWM Annual Meeting Report of the S&T Committee Item 310-4). The S&T Committee withdrew the proposal because of opposition and asked the Weighing Sector to conduct additional work to clarify the intent of the requirement and ensure it applies to the appropriate applications.

**Discussion:** The Sector was asked to review the background information and an example from the New York NTEP laboratory demonstrating the height of the units display compared to the weight display.

The Sector also reviewed a proposal from the New York and Maryland NTEP laboratories for a new NIST Handbook 44 specification paragraph that specifies the minimum height requirements for primary weight indications and units of measure.

### G-S.5.2.3. Size and Character.

- (a) In any series of graduations, indications, or recorded representations, corresponding graduations and units shall be uniform in size and character. Graduations, indications, or recorded representations that are subordinate to or of a lesser value than others with which they are associated shall be appropriately portrayed or designated.  
[Retroactive as of January 1, 1975]
- (b) The display of primary measurement indications on both the operator and the customer side shall be clear and at least 9.5 mm in height.  
[Nonretroactive as of January 1, 200X]
- (c) The display of the character size of the units of mass, on both the operator and the customer side, shall be no less than a factor of 0.6 times the width and 0.6 times the height of the numeric values.  
[Nonretroactive as of January 1, 200X]

The NIST Technical Adviser provided the following information for consideration during the discussion of this item.

- Handbook 44 Section 5.54 Taximeters, Sections 5.56.(a) and 5.56.(b) Grain Moisture Meters, and Section 5.57. Near-Infrared Grain Analyzers already include specifications for the minimum height of figures, words and symbols.
- OIML R 76 Non Automatic Weighing Systems states that the minimum height of weight indications is 9.5 mm, and 2 mm for capital letters on required markings.
- OIML R 117 Measuring Systems for Liquids Other Than Water states that the minimum height of the quantity indication on fuel dispensers 10 mm (4 mm for other liquid-measuring devices) with the minimum height of the price indication no less than 4 mm.
- Additionally, “unit of measurement” should replace “unit of mass” in the proposed paragraph G-S.5.2.3. to be consistent with Handbook 44 language since the requirement would apply to all weighing and measuring devices. For example, paragraph G-S.5.3.1. On Devices That Indicate in More than One Unit. refers to the “unit of measurement.”

One of the manufacturers stated that the proposal is more restrictive than the language in OIML R 76 since OIML R 76 states that the height requirement applies to direct sale applications and prefers that the height of the analog weight indications be based on the distance between the customer and the indicating device, and that R 76 OIML also states a minimum 2 mm for marked information. Additionally, annunciators such as “▲” that point to the units of measures are often smaller than 2 mm in height and manufacturers are limited to the display heights from their vendors. Other manufacturers stated that the marketplace will decide what is an acceptable height for weight displays. They added that the costs for a vendor to tool up for a custom display would be prohibitive. The manufacturers were also concerned about indicating elements such as video display monitors where the height of the weight values may change with the height of the display (monitor). The NIST technical advisor suggested that a user requirement could be developed for users that replace indicating elements with indicating elements that are not from the original equipment manufacturer.

The Maryland NTEP laboratory stated that the New York laboratory’s (The New York Sector member was unable to attend the meeting) concern was primarily with the height of the lettering of the unit of measure in their example and that both the Maryland and New York laboratories are agreeable to limit the language for minimum height requirements to direct sales to the public applications. Don Onwiler, Nebraska NTEP laboratory, stated that there will some applications where the device complies with the minimum requirements but may still be difficult to read because of the distance or the brightness and contrast of the display. Don Onwiler added that officials may have to be educated that the proposal does not conflict with Handbook 44 General Code G-S.5.1. General (Indicating and Recording Elements), G-UR.2.2. Installation of Indicating or Recording Elements, G-UR.3.3. Position of Equipment when the device complies with the specific height requirements in the Scales Code but is still not clear and easily read because of the individual circumstances of the installation.

**Recommendation:** The Sector agreed that any proposal to specify the height of the weight display and units indications in NIST Handbook 44 should be limited to the Scales Code and should align with OIML R 76 to the extent possible. The size requirements should be limited to weight indications visible to the customer in direct sale applications, the weight display should be no smaller than 9.5 mm, and the units display or marking should be no smaller than 2 mm.

The NIST technical advisor, the New York and Maryland laboratories, and Jesus Zapien (A&D Engineering) were asked to rework the proposal in the agenda based on the recommendations of the Sector. The Sector will be balloted on the language developed by the small work group and submitted, if acceptable, for consideration to the Southern Weights and Measures Association at their 2005 annual meeting and the NCWM Review panel during the week of October 23, 2005.

## **18. Automatic Weighing Systems Influence Factor Temperature Ranges that Exceed –10 °C to 40 °C**

**Source:** Ohio NTEP Participating Laboratory

**Background:** The Ohio NTEP Participating Laboratory has received NTEP applications to evaluate automatic weighing systems (AWS) with temperature ranges that exceed the standard temperature range of –10 °C to 40 °C. The applicant made the request on behalf of their customer since the AWS may be used in environments that are warmer than 40 °C

(104 °F). Handbook 44 Section 2.28 Automatic Weighing Systems Table S.7.b., footnote 5 states that the temperature range shall be marked “only on automatic weighing systems if the range is other than –10 °C to 40 °C (14 °F to 104 °F).”

The laboratory stated that testing above 40 °C or below –10 °C puts an unnecessary strain on both the environmental chamber and the NTEP technician who has to go into the chamber to perform the tests. There are some CC already issued with a stated temperature higher than 40 °C, but the vast majority of these are “Provisional” CCs for Wheel Load Weighers where no temperature testing has ever been performed by NTEP. If the NTEP laboratories ever acquire the capability to temperature test these devices in order to change the status of the CC from “Provisional” to “Full”, they will most likely revert to the standard temperature range. There is at least one CC for a Class III scale that has a temperature higher than 40 °C stated on it (CC 92-213A2) and was tested at that temperature.

The laboratory is also concerned that other manufacturers will very likely decide that their device would be more marketable to a customer if it has been tested at 50 °C. This would turn the NTEP CC into an advertising tool and may initiate a never-ending escalation of temperature test requests from manufacturers.

The NIST Technical Advisor reported that OIML R 76 Non-automatic Weighing Systems paragraph 3.9.2.1. Prescribed temperature and 3.9.2.2. Special temperature limits and OIML R 51 Automatic Catchweighing Instruments and other OIML Recommendations have similar temperature marking requirements as the AWS code and other Handbook 44 codes.

**Discussion:** The Sector was asked to review the background information and consider submitting a proposal from the Ohio NTEP Participating Laboratory to amend Handbook 44 Section 2.28 Automatic Weighing Systems Table S.7.b. footnote 5 to the next meeting of the Southern Weights and Measures Association. The proposed language is identical to Handbook 44 Section 2.20. Scales Code Table S.6.3.b. Notes for Table S.6.3.a. footnote 5.

Table S.7.b. Notes for Table S.7.a.	
5.	Required only on automatic weighing systems if the range <u>on the NTEP CC</u> is <u>narrower</u> <del>other</del> <u>than and within</u> – 10 °C to 40 °C (14 °F to 104 °F).

The NIST Technical Adviser recommended that Handbook 44 Sections 2.21. Belt-Conveyor Scale Systems paragraph S.4.e. Markings Requirements, 2.22. Automatic Bulk Weighing Systems paragraph S.5. Markings Requirements, and 5.58. Multiple Dimension Measuring Devices Table S.1.4.b. Notes for Table S.1.4.a. be amended to be consistent with the Scales Code.

The Sector commented that the language for the influence factor temperature requirements is worded differently among the various weighing device codes even though the range of temperatures is consistent (–10 °C to 40 °C). Unlike the Handbook 44 Scales Code paragraph T.N.2.3. Subsequent Verifications, not all of the weighing device codes in Handbook 44 include the language that states that tolerance values apply regardless of the influence factors in effect at the time of the conduct of the examination. Additionally, weighing devices that are marked with a temperature range may not be suitable to the installations if it is used in applications where the ambient temperature exceed that temperature range that is marked on the device Handbook General Code paragraphs G-UR.1.2. Environment (Selection Requirement) and G-UR.3.1. Method of Operation states that equipment shall be suitable for the environment in which it is used and operated only in a manner that is indicated by instructions on the device.

The NTEP Director stated that the AWS Code marking requirements are restrictive because the suitability of the device can be determined by the marking on the device. For example, Handbook 44 Scales Code Table S.6.3.a. Marking Requirements Note 5 states that the temperature range shall be marked on the device if the range is **narrower than** – 10 °C to 40 °C, whereas AWS Code Table S.7.a. Marking Requirements Note 5. states that the markings are required if the temperature range is **other than** –10 °C to 40 °C. The NTEP Director is also concerned by the use of the term “temperature limit” in Scales code paragraph T.N.8.1.1. and T.N.8.1.2. and similar language in the other weighing device codes, and that the “limits” could be misinterpreted as a consideration for the suitability of a device at a particular installation.

The manufacturers believe that the range of temperature testing needs to be the same among the NTEP laboratories, otherwise, applicants will select the NTEP laboratories that have a greater temperature testing capabilities creating an uneven workload for all the NTEP Participating Laboratories. The manufacturers also believe that the testing for compliance with temperature influence factor requirement should not be below  $-10^{\circ}\text{C}$  or above  $40^{\circ}\text{C}$  to avoid expanded temperature ranges listed on the CC being used by applicants for marketing purposes. One manufacturer suggested that the range of testing should be specified in Handbook 44. The NTEP Director added that Handbook 44 does not specifically state that temperatures tests are required if the device is marked with a temperature range that is wider or other than  $-10^{\circ}\text{C}$  to  $40^{\circ}\text{C}$ .

The NTEP laboratories were concerned that a device may be marked with a temperature range wider than the temperature tests listed in the test conditions in the CC since the CC only lists the temperatures that were tested on the device (Note: This is not a concern for devices with a marked temperature range that is narrower than  $-10^{\circ}\text{C}$  to  $40^{\circ}\text{C}$  since compliance with the narrower temperature range is verified during NTEP evaluation).

A question was asked if an applicant could request that the CC be listed with a temperature range wider than  $-10^{\circ}\text{C}$  to  $40^{\circ}\text{C}$  if the applicant provided credible data that the device complies with the expanded temperature range. The Sector believed that a policy listing a wider temperature range on the CC than what was larger than the temperature range verified by NTEP would lead to applicants taking advantage of the larger temperature range and inferring that the quality of the device was better than other devices that were listed with the standard temperature range. Darrell Flocken, Mettler Toledo, added that influence factor testing for temperature should not be a quality or marketing issue, temperature tests verify compliance with Handbook 44, and that applicants can demonstrate the knowledge and the ability to comply the requirements. Russ Wykoff, Oregon NTEP laboratory, asked what will happen if a manufacturer marks the device with a larger temperature range than the  $-10^{\circ}\text{C}$  to  $40^{\circ}\text{C}$  that was evaluated during type evaluation. The manufacturers responded that NTEP cannot control additional identification information marked on the device since the manufacturer must also comply with the marking requirements of other agencies that may be different than the temperature markings for other purposes than the accuracy requirements in Handbook 44.

**Recommendation:** The Sector agreed that the range of temperatures over which the NTEP laboratories will conduct temperature tests are  $-10^{\circ}\text{C}$  for the lowest temperature tested and  $+40^{\circ}\text{C}$  as the highest temperature. The Sector recommends that that NCWM Publication 14 Technical Policy B.1. Influence Factor Requirements and K. 59. Tests Procedures for Influence Factors, be amended and shown in [Appendix A-Agenda Item 18](#) to limit the scope of temperature test that will be conducted by the NTEP laboratories.

The Sector did not provide a recommendation to amend NIST Handbook 44 AWS Code Table S.7.b. Note 5 at this time. The Sector believes that a more thorough review of Handbook 44 paragraph G-UR.1.2. Environment, and Scales Code Table S.6.3.b. Note 5 and paragraphs T.N. 2.3. Subsequent Verification and T.N.8.1. Temperature is needed in order to assure that suitability, marking, and performance requirements are consistent throughout Handbook 44 weighing sections, and that the temperature limits specified in the handbook are correctly applied by field officials in determining the suitability of a weighing device in various installations. Darrell Flocken will ask the SMA to take on this assignment and bring a recommendation back to the NTEP laboratories and the Weighing Sector during their 2005 Fall meeting.

Todd Lucas, (NCWM S&T Committee) agreed to update the 2006 NCWM S&T Committee about the sector discussions and recommendations and that “clean-up” work has been identified regarding Handbook 44 language for subsequent tests, temperature limits, and marking requirements in order that the language is consistent throughout in NIST Handbook 44 Section 2.

Lou Straub, Fairbanks Scales, agreed to notify the NCWM Review Panel at their next meeting that the SMA and Weighing Sector may be developing future proposals to amend NIST Handbook 44 temperature marking, performance, and suitability requirements.

Juana Williams (NIST), Steven Cook (NIST), and Darrell Flocken (Mettler Toledo) agreed to develop a summary paragraph, with points that need to be addressed (e.g., temperature testing at the time of the NTEP evaluation vs. ambient temperature during subsequent verifications and the marked temperature range).

## 19. Criteria for Railway Track Scales With a Rotary Dump Option

**Submitted by:** Bob Feezor, Norfolk Southern Corporation

**Background:** Manufacturers of rotary dump mechanisms for railway track cars offer a weighing option where a railway track scale is built into, or installed in the rotary dump mechanism. The manufacturers of these systems frequently believe that the railway track scale is approved for this application (or in some cases, just the load cells and indication elements), and is covered by an NTEP CC. Additionally, there are many existing rotary dump mechanisms that were installed prior to the formation of NTEP that are nearing the end of their useful life and the users of these devices are requesting that the railway track scales be covered by NTEP CCs. The submitter of this item is concerned there are no documented policies and test criteria for these devices, and therefore promotes inconsistent enforcement of the NTEP requirements on these devices.

NTEP and the laboratories have consistently stated that a railway track scale CCs must include the rotary dump mechanism must be verified by NTEP and subsequently listed on the CC. The problem is that this policy is not documented in NCWM Publication 14, nor are there any documented procedures to test the rotary dump scales.

Robert Feezor recommend recommended that *ad hoc* policies and test criteria should be developed to add the rotary dump mechanism as a feature on the.

**Recommendation:** The Sector agreed with the submitter that the rotary dump option should be included on CCs for railway track scales, and that NTEP Technical Policies and test criteria are needed for Pub 14. Robert Feezor and Steve Cook agreed to draft technical policies and test criteria will be developed and submitted for the 2006 meetings of the NTEP Labs and Weighing Sector.

## 20. Permanence Tests for Identification Information

**Submitted by:** Stephen Patoray, NTEP Director

**Background:** NCWM Publication 14 Section 1. Marking Complete Scales addresses permanence testing of identification information on complete scales. The sections for indicating elements, weighing/load-receiving elements, and livestock, vehicle, and railway track scales do not have any requirements for the permanence testing of the identification information and do not refer to the procedures in section 1.

**Recommendation:** The Sector recommends that the sections for marking requirements be consolidated and reorganized. The NIST technical advisor has worked on a proposed consolidation of the marking requirements that removes language that is repeated in Sections 2 through 5 and referenced the general requirements in Section 1; the proposed consolidation that has been re-titled as 1. Marking- Applicable to Indicating, Weighing/Load-Receiving Elements and Complete Scales. The NIST technical advisor will also ballot the Sector on the proposed changes in [Appendix A-Agenda Item 1\(c\)](#) and report the results to the NTEP Committee prior to the 2006 NCWM Interim Meeting.

### *NIST Technical Advisor's Note:*

The Sector recommendation to amend the capacity markings sections of Publication 14 in [Appendix A-Agenda Item 1\(c\)](#) have been consolidated with the Sector recommend changes in Agenda Item 20. Permanence Tests for Identification Information.

## 21. Next Sector Meeting

**Discussion:** The locations for Weighing Sector meetings are typically rotated among the participating NTEP laboratories. If this schedule is followed, the location for the 2006 Weighing Sector meeting would be at the Maryland NTEP Participating Laboratory in Annapolis, Maryland. The Sector received a recommendation to hold the 2006 meeting in conjunction with the 2006 Western Weights and Measures Association Technical Conference. Another recommendation is to hold the meeting on a Tuesday through Thursday, since many airlines no longer have Saturday

night layover restrictions. Lou Straub, Fairbanks Scales, cautioned that there are large annual boat shows and Navy Academy events in the fall that may affect the cost of lodging during the Sector meeting.

**Recommendation: The Sector recommends the next 2006 Sector meeting in Annapolis, Maryland, and that it start on a Tuesday. The Sector also recommended that NCWM headquarters look into holding the 2007 meeting of the Weighing Sector in conjunction with the WWMA Technical Conference in Lake Tahoe, Nevada.**



## Appendix A

### Recommendations for Amendments to Publication 14

**General Note.** Unless otherwise noted, the following language from the 2005 edition of NCWM Publication 14 language that includes proposed changes are highlighted in gray. Revisions recommended by the Sector are shown by ~~crossing out~~ information to be deleted and underlining information to be added.

Agenda Item 1 (a) **Footnote to S.1.8.4.**

#### Digital Electronic Scales Section 76. List of Acceptable Abbreviations/Symbols

Device Application	Term	Acceptable	Not Acceptable
ECRs, Recorded Representations:	net weight indication in pounds	“pound” or “lb” the symbol “#” should be discouraged	the “#” symbol for pound

#### Electronic Cash Registers Interfaced with Scales Section 11. Recorded Representation Point-of-Sale Systems

- 11.1. Customer's receipts must contain:
- 11.2. Net weight identified by the word "pound", "lb", "kilogram", "kg", "gram", "g", "ounces", ~~or~~ "oz". The use of the symbol "#" for pound is not acceptable discouraged. Yes ☐ No ☐ N/A ☐

Agenda Item 1 (b) **Automatic Zero-Setting Mechanism (Zero-tracking)**

#### 43. Automatic Zero-Setting Mechanism (AZSM) (Zero Tracking)

**Code References:** S.2.1.3., S.2.1.3.1., S.2.1.3.2., and S.2.1.3.3.

A scale may be equipped with an AZSM capability to automatically correct for weight variations near zero within specified limits. To reduce the potential for weighing errors, the AZSM may operate only under limited conditions as indicated in the specific type evaluation criteria.

Class III L and III/III L devices equipped with AZSM, shall be designed with a sealable means to allow the AZSM to be disabled during the inspection and test of the device.

- The limits for AZSM are:
- (a) for bench, counter, and livestock scales manufactured prior to January 1, 2007 \*. 0.6 d
  - (b) for vehicle, axle-load, and railway track scales: 3.0 d; ~~and~~
  - (c) for all other scales manufactured prior to January 1, 2007 \*. 1.0 d, ~~and~~
  - (d) for all other scales including bench, counter, and livestock scales manufactured on or after January 1, 2007 \*: 0.5 d.

Note: Applicants for new weighing device and load-receiving elements are encouraged (but not required) to submit their devices to the 2007 criteria. September 2006 is the cutoff date for new submissions for devices that limit the AZSM to 0.6 d and/or 1.0 d \*. All scales of this category manufactured after 2007 must comply with the 0.5 d requirement.

\*(date of manufacture and sections (a) and (c) to be deleted in the 2007 edition of Publication 14)

Record the AZSM capability provided.

- ☐ No AZSM capability.
- ☐ AZSM is always operational. (except for Class III/III L and III L devices)
- ☐ AZSM activated or deactivated by an external switch.
- ☐ AZSM activated or deactivated by an internal switch or selected by programming at the time of installation.
- ☐ The magnitude of the AZSM increment is selectable.

~~For devices bench, counter, and livestock scales falling under S.2.1.3.1. (a) and S.2.1.3.2 (b), for that is, bench, counter, and livestock scales,~~ AZSM may be operable with the device at a gross load zero, at a net load zero, or at a negative net weight indication resulting from a tare weight entry having been made with the scale at zero gross load.

For scales other than bench, counter, and livestock scales falling under S.2.1.3.1. (a) and S.2.1.3.2. (b), and vehicle, axle-load and railway track scales, AZSM may be operable only at a gross load zero.

Indicate where AZSM is operational.

- ☐ Gross Zero
- ☐ Net Zero
- ☐ Negative with Tare

Test Procedure for AZSM: With the scale at zero balance, place a load in excess of the AZSM range for the scale, e.g., 10d. Add error weights that are slightly in excess of the specified AZSM limit for the device or the AZSM setting. Remove the load, (e.g., 10d) but leave the error weights on the scale. Observe whether or not the scale automatically zeroes the error weights. Repeat this procedure by decreasing or increasing the amount of error weights to determine the zeroing range of the AZSM. Perform this test in an analogous manner on the negative side of zero to determine the zero range of AZSM on the negative side of zero.

If the device has an AZSM capability, record the maximum amount (in scale divisions) that can be zeroed at one time.

- ☐ AVOIRDUPOIS: \_\_\_\_\_ d
- ☐ METRIC: \_\_\_\_\_ d
- ☐ OTHER UNITS Identify units \_\_\_\_\_ d

- |       |                                                                                                                                                                                                                                                   |                                                                                       |
|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 43.1. | This amount must comply with S.2.1.3. for the intended application.                                                                                                                                                                               | Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/> |
| 43.2. | AZSM shall not be operable on any hopper scale.                                                                                                                                                                                                   | Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/> |
| 43.3. | <u>For vehicle, axle-load, and railway track scales, and devices scales other than bench, counter, and livestock scales falling under S.2.1.3. (b) and (e) AZSM may be operable only at a gross load zero.</u>                                    | Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/> |
| 43.4. | AZSM shall not be operational when the scale is displaying a positive weight value greater than the maximum AZSM quantity allowed.                                                                                                                | Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/> |
| 43.5. | <u>Devices falling under S.2.1.3.1. Hopper scales used in automatic bulk-weighing systems and all Class III L scales</u> shall be equipped with a sealable means to enable/disable or set the AZSM window to zero (0) for testing and inspection. | Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/> |

Agenda Item 1 (c) and 20. Table S.6.3.b. Note 3 – Nominal Capacity and Value & Permanence Tests for Identification Information

**Note:** The following proposed amendments to Publication 14 includes the changes recommended in Agenda Item 1 (c) and Agenda Item 20 and includes the language that approved by the Sector in Ballot number 91-04 with changes recommended by NIST WMD that deletes the example of a portable beam scale from the example of scales that did not need capacity markings.

*The results of the vote were forwarded to the NTEP Committee prior to the 2006 NCWM Interim Meeting.*

**1. Marking- Applicable to Indicating, Weighing/Load-Receiving Elements and Complete Scales**

**Code References: G-S.1. and G-S.7.: General Code Requirements, Identification**

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**Marking - Accuracy Class, Verification Scale Division, and Temperature Limits**

**Code References: S.6., Table S.6.3.a., and Table S.6.3.b.**

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**Marking Nominal Capacity, Value of the Scale Division, Special Applications**

**Code References: S.6., S.6.6., Table S.6.3.a., and Table S.6.3.b.**

This requirement applies to digital indicating elements and to both the operator's and customer's indications on complete scales. The lettering must be permanent as described in Section 1, but the attachment of any badge or decal is slightly less stringent than for the G-S.1. information. In terms of attachment, any badge or decal must be "durable," that is, it must be difficult to remove (at all temperatures). Remote weight displays (except "scoreboard" displays), the customer's weight display provided for scales interfaced with electronic cash registers (ECRs), and weight displays which are built into ECRs must be marked with the scale capacity and scale division. The nominal capacity shall be shown together with the value of the scale division (e.g., 15 x 0.005 kg, 30 x 0.01 lb, or capacity = 15 kg, d = 0.005 kg) in a clear and conspicuous manner and be readily apparent when viewing the reading face of the scale indicator.

The system must be clearly and permanently marked on an exterior surface, visible after installation, as follows:

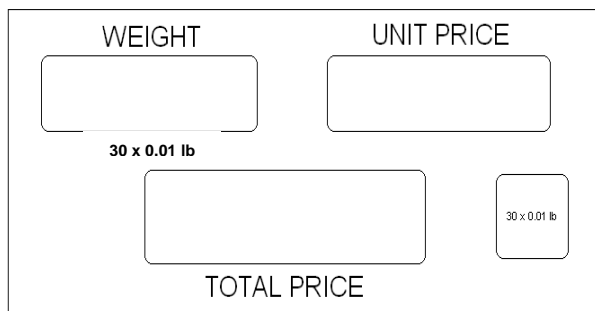
- 1.1        The name, initials, or trademark of the manufacturer or distributor. A remote display    **Yes ☐ No ☐ N/A ☐**  
is required to have the manufacturer's name or trademark and model designation.  
(Code Reference G-S.1.)
- 1.13.     The nominal capacity by minimum scale division shall clearly and conspicuously be    **Yes ☐ No ☐ N/A ☐**  
marked in a clear and conspicuous manner and be readily apparent when viewing the  
reading face of the scale indicator unless already apparent by the design of the device  
adjacent to the weight display (acceptable location depends on conspicuousness).
- This applies to mechanical scales, such as portable platform scales, with removable  
counterpoise weights marked since: 1) the markings on the weights are not readily  
apparent by viewing the reading face of the scale, 2) the additional weights are not a  
permanent part of the scale, and 3) additional weights can be added to the scales to  
incorrectly increase the capacity of the scale.
- 1.14.     The capacity by division size shall be marked for all weight units that can be displayed    **Yes ☐ No ☐ N/A ☐**  
such as in both pounds and kilograms.
- 1.15.     If equipped with variable resolution, the scale shall be marked with the weight ranges    **Yes ☐ No ☐ N/A ☐**  
and corresponding scale division sizes.

Example: 0-3 kg (6 lb) x 1 g (0.002 lb)            0-6 lb x 0.002 lb  
             3-6 kg (15 lb) x 2 g (0.005 lb)        or    6-15 lb x 0.005 lb  
             6-15 kg (33 lb) x 5 g (0.01 lb)        15-33 lb x 0.01 lb

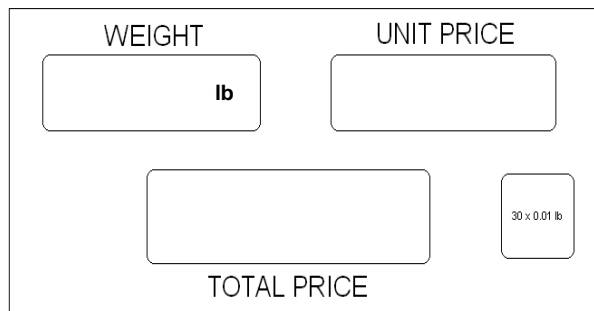
- 1.16. If the capacity by division statement is displayed on a video terminal with the weight values, then the capacity by division statement must be indicated in a clear and conspicuous manner and be readily apparent when viewing the reading face of the scale indicator unless already apparent by the design of the device adjacent to the weight display and displayed whenever the system is in the weighing mode. Yes ☐ No ☐ N/A ☐

The following examples represent capacity and value markings that are conspicuous and readily apparent when viewing the reading face. Each scale division value or weight unit shall be marked on multiple range or multi-interval scales. The capacity by division statement may be part of the scale display or marked adjacent to the display.

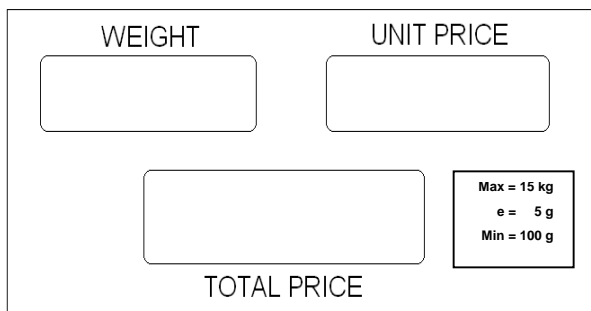
The capacity by value markings are not required if they are already apparent by the design of the device such as the largest weight value that is defined on a single revolution scale, fan scale, and beam scales and balances.



Example 1

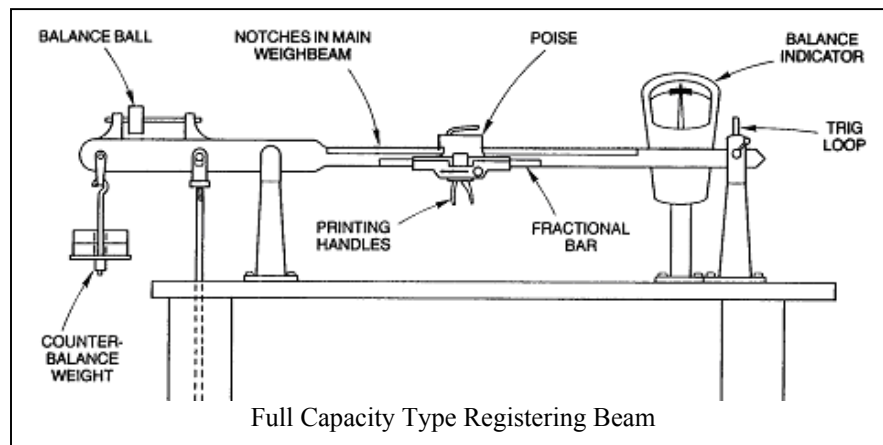
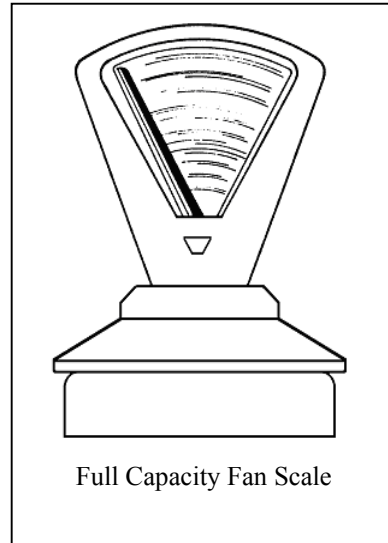


Example 2



Example 3

The following examples are types of scales where the capacity by scale division is readily apparent since the graduations, and beam capacities are marked with their respective values.



- 1.17. Scales designed for special applications must be conspicuously marked to limit their use. **Yes** ☐ **No** ☐ **N/A** ☐  
Special marking used: \_\_\_\_\_

- 1.23.3. The indicator is electronically linked to the weighing/load-receiving element and cannot be replaced without calibration. **Yes** ☐ **No** ☐ **N/A** ☐

## 2. Additional Marking Requirements- Indicating Elements

Weighing/load-receiving elements and indicators that are; (1) in the same housing, or (2) permanently hard wired together, or (3) sealed with a physical seal or an electronic link, shall have markings that comply with Section 1 Markings - Applicable to Indicating, Weighing/Load-Receiving Elements and Complete Scales.

**Code References:** S.6., Table S.6.3.a., and Table S.6.3.b.

Since the United States permits indicating and weighing/load-receiving elements . . .

<u>2.1.</u>	<u>The name, initials, or trademark of the manufacturer. A remote display is required to have the manufacturer's name or Trademark and model designation. (Code Reference G S.1.)</u>	<u>Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/></u>
<u>2.2.</u>	<u>The manufacturer's model designation that positively identifies the type or design. The Model designation shall be prefaced by the word "Model," "Type," or "Pattern." These terms may be followed by the term "Number" or an abbreviation of that word. The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.) The abbreviation for the word "Model" shall be "Mod" or Mod." (Code Reference G S.1.)</u>	<u>Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/></u>
<u>2.3.</u>	<u>Except for equipment with no moving or electronic component parts, a non-repetitive serial number. (Code Reference G S.1.)</u>	<u>Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/></u>
<u>2.4.</u>	<u>The serial number shall be prefaced by words, an abbreviation, or a symbol, that clearly identifies the number as the required serial number. (Code Reference G S.1.)</u>	<u>Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/></u>
<u>2.5.</u>	<u>The serial number shall be prefaced by the words "Serial Number" or an abbreviation of that term. Abbreviations for the word "Serial" shall, as a minimum, begin with the letter "S," and abbreviations for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., S/N, SN, Ser. No, and S No.). (Code Reference G S.1.)</u>	<u>Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/></u>
<u>2.6.</u>	<u>[Code Reference G S.1. (g).]</u>	<u>Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/></u>
	<u>The NTEP Certificate of Conformance (CC) Number or a corresponding CC addendum number for devices that have (or will have) a CC. The number shall be prefaced by the terms "NTEP CC," "CC," or "Approval." These terms may be followed by the word "Number" or an abbreviation for the word "Number." The abbreviation shall as a minimum begin with the letter "N" (e.g., No or No.).</u>	
	<u>The device must have an area, either on the identification plate or on the device itself, suitable for the application of the Certificate of Conformance Number. If the area for the CC number is not part of an identification plate, note its intended location and how it will be applied.</u>	
	<u>Location of CC Number if not located with the identification information:</u>	
	<u>_____</u>	
	<u>_____</u>	
	<u>_____</u>	
<u>2.7.</u>	<u>If the information required by G S.1. is placed on a badge or plate, the badge or plate must be permanently attached to the device. (See criteria above for permanence of Attachment of Badge.)</u>	<u>Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/></u>
<u>2.8.</u>	<u>Identifying information shall be so located that it is readily observable without the necessity of the disassembly of a part requiring the use of any means separate from the device.</u>	<u>Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/></u>
<u>2.9.</u>	<u>The indicator is marked with its accuracy class. Indicate class: _____</u>	<u>Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/></u>
<u>2.10.</u>	<u>The device meets all the parameters for the accuracy class.</u>	<u>Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/></u>
<u>2.11.</u>	<u>The indicator is marked with the maximum number of scale divisions (for each accuracy class) for which it complies with requirements.</u>	<u>Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/></u>
<u>2.12.</u>	<u>The system shall be marked with the operating temperature range if the temperature range is other than 14 °F to 104 °F (–10 °C to 40 °C).</u>	<u>Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/></u>
<u>2.13.</u>	<u>The nominal capacity by minimum scale division shall be clearly and conspicuously marked adjacent to the weight display (acceptable location depends on conspicuousness).</u>	<u>Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/></u>



- |        |                                                                                                                                                                                                                                                                                                                                                                        |                                                                                       |
|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 2.14.  | The capacity division size shall be marked for all weight units that can be displayed, such as, both lb and kilograms.                                                                                                                                                                                                                                                 | Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/> |
| 2.15.  | If equipped with variable resolution, the scale shall be marked with the weight ranges and corresponding scale division sizes.                                                                                                                                                                                                                                         | Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/> |
| 2.16.  | If the capacity by division statement is displayed on a video terminal with the weight values, then the capacity by division statement must be adjacent to the weight display and displayed whenever the system is in the weighing mode.                                                                                                                               | Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/> |
| 2.17.  | All markings must be clear and easily readable.                                                                                                                                                                                                                                                                                                                        | Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/> |
| 2.18.  | The lettering must be permanent (use the procedures outlined in section 1 for "Permanence of Lettering"). Record the grade for the permanence of markings:                                                                                                                                                                                                             | Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/> |
|        |                                                                                                                                                                                                                                                                                                                                                                        |                                                                                       |
| 2.319. | The badge or decal must be durable (difficult to remove at all temperatures).                                                                                                                                                                                                                                                                                          | Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/> |
| 2.420. | If the indicator is for Class III/III L applications, the "CLC" (concentrated load capacity) shall be marked on or adjacent to the identification markings or nomenclature plate that is attached to the system. (or space provided to include the CLC).                                                                                                               | Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/> |
| 2.521. | The section capacity of a railway track and livestock scale-indicating element shall be marked on or adjacent to the identification badge on the indicating element. The section capacity shall be prefaced by the words "Section Capacity" or an abbreviation of that term. Abbreviations shall be "Sec Cap" or "Sec C." All capital letters and periods may be used. | Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/> |

### 3. **Additional Marking Requirements**- Not Built-for-Purpose Software-Based Devices

**Code Reference:** G.S.1.1.

- 3.1. At least one of the following methods must be used:
- |        |                                                                                                                                                                                                      |                                                                                       |
|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 3.1.1. | The manufacturer or distributor and the model designation are marked on the device according to Section 1 Markings - Applicable to Indicating, Weighing/Load-Receiving Elements and Complete Scales. | Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/> |
|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|

### 4. **Additional Marking Requirements** – Weighing/Load-Receiving Elements

**Code References:** S.6., Table S.6.3.a., and Table S.6.3.b.

Weighing/load-receiving elements and indicators that are; (1) in the same housing, or (2) permanently hard wired together, or (3) sealed with a physical seal or an electronic link, shall have markings that comply with section "1 Markings - Applicable to Indicating, Weighing/Load-Receiving Elements and Complete Scales". This does not apply . .

- |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                       |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 4.1. | The name, initials, or trademark of the manufacturer or distributor. A remote display is required to have the manufacturer's name or trademark and model designation.                                                                                                                                                                                                                                                                                  | Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/> |
| 4.2. | A model designation that positively identifies the pattern or design of the device. The Model designation shall be prefaced by the word "Model," "Type," or "Pattern." These terms may be followed by the term "Number" or an abbreviation of that word. The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.)The abbreviation for the word "Model" shall be "Mod" or "Mod." (Code Reference G S.1.) | Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/> |
| 4.3. | Except for equipment with no moving or electronic component parts, a Non-repetitive serial number. (Code Reference G S.1.)                                                                                                                                                                                                                                                                                                                             | Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/> |

- 4.4. ~~The serial number shall be prefaced by words, an abbreviation, or a symbol, that clearly identifies the number as the required serial number. (Code Reference G S.1.)~~ **Yes ☐ No ☐ N/A ☐**
- 4.5. ~~The serial number shall be prefaced by the words "Serial Number" or an abbreviation of that term. Abbreviations for the word "Serial" shall, as a minimum, begin with the letter "S," and abbreviations for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., S/N, SN, Ser. No, and S No.). (Code Reference G S.1.)~~ **Yes ☐ No ☐ N/A ☐**
- 4.6. ~~[Code Reference G S.1. (e).]~~ **Yes ☐ No ☐ N/A ☐**
- ~~The NTEP Certificate of Conformance (CC) Number or a corresponding CC addendum number for devices that have (or will have) a CC. The number shall be prefaced by the terms "NTEP CC," "CC," or "Approval." These terms may be followed by the word "Number" or an abbreviation for the word "Number."~~
- ~~The abbreviation shall as a minimum begin with the letter "N" (e.g., No or No.).~~
- ~~The device must have an area, either on the identification plate or on the device itself, suitable for the application of the Certificate of Conformance Number. If the area for the CC number is not part of an identification plate, note its intended location and how it will be applied.~~
- ~~Location of CC Number if not located with the identification information:~~
- 
- 
- 
- 4.7. ~~If the information required by G S.1. is placed on a badge or plate, the badge or plate must be permanently attached to the device. (See criteria above for permanence of Attachment of Badge.)~~ **Yes ☐ No ☐ N/A ☐**
- 4.8. ~~Identifying information shall be so located that it is readily observable without the necessity of the disassembly of a part requiring the use of any means separate from the device.~~ **Yes ☐ No ☐ N/A ☐**
- 4.19. The nominal capacity of the weighing/load-receiving element. **Yes ☐ No ☐ N/A ☐**
- 4.210. Its accuracy class. Indicate class: \_\_\_\_\_ **Yes ☐ No ☐ N/A ☐**
- 4.11. ~~The device meets all the parameters for the accuracy class.~~ **Yes ☐ No ☐ N/A ☐**
- 4.312. The maximum number of scale divisions for which it complies with requirements. **Yes ☐ No ☐ N/A ☐**
- 4.413. The minimum verification scale division for which it complies with requirements. **Yes ☐ No ☐ N/A ☐**
- 4.514. The weighing/load-receiving element shall be marked with the operating temperature range if the temperature range is other than 14 °F to 104 °F (–10 °C to 40 °C). **Yes ☐ No ☐ N/A ☐**
- 4.615. The lettering must be permanent. Record the grade for the permanence of markings: (Use procedures in section 1.) **Yes ☐ No ☐ N/A ☐**
- 4.716. If the information is placed on a badge or plate, the badge or plate must be permanently attached to the device. If a badge, label, or plate made of a metal or plastic is used, then it must be riveted, welded, or attached to the scale by an adhesive so that a tool is required to remove it (bolts or removable screws are not acceptable). **Yes ☐ No ☐ N/A ☐**
- 4.817. The information must be mounted on a protected surface such as the side of the weighing/load-receiving element, behind a ramp or under a cover plate. Access to the marking should be available with minimum effort. **Yes ☐ No ☐ N/A ☐**

Location of the required identification information:

- ~~4.918.~~ The information must be on a surface that is an integral part of the chassis. Yes ☐ No ☐ N/A ☐
- ~~4.19.~~ ~~All markings must be clear and easily readable.~~ ~~Yes ☐ No ☐ N/A ☐~~
- 4.1020 The identification information for the weighing/load-receiving elements of vehicle, axle-load, livestock, and railway track scales shall be located: Yes ☐ No ☐ N/A ☐
- 4.1020.1. Near the point where the signal leaves the weighing/load-receiving element. This would be the transverse lever on a mechanical scale. Yes ☐ No ☐ N/A ☐
- 4.1020.2. The information shall be on or near the junction box nearest the point where the signal leaves the scale on an above-ground scale. Yes ☐ No ☐ N/A ☐

## 5. **Additional Marking Requirements - Livestock, Vehicle, and Railway Track Scales**

Code References: G-S.1., G-S.5.1., ~~and S.6.3, S.6.4., and S.6.5.~~

*No additional changes to this section.*

## 6. **Additional Marking Requirements - Force Transducers (Load Cells)**

Code References: S.6., Table S.6.3.a., and Table S.6.3.b.

*No additional changes to this section.*

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## ***Proposed changes to ECRS Sections 5 and 7.***

### **5. Identification**

Code References: G-S.1., G-S.5.1., and S.6.3

**Example Modular System:** Point of sale systems may consist of a file server, CPU, keyboard, printer, display, and cash drawer. A file server, which performs metrological functions such as price computations, must be marked with the system make, model, and unique serial number with required prefix. File servers, which only store information processed by other components in the system, need not be marked in accordance with S.6.3.

“Dumb” indicators with no intelligence (such as remote displays on point-of-sale systems) do not require marking in accordance with S.6.3. unless they are the primary indicator for the system. Primary indicators must be marked with or display have a manufacturer’s ID, model designation, serial number and prefix, accuracy class, and  $n_{max}$ . The capacity by division statement must be indicated in a clear and conspicuous manner and be readily apparent when viewing the reading face of the scale indicator and capacity and division size (adjacent to the weight display).

### **7. Marking Requirements**

Code References: ~~S.6.1.,~~ S.6.2., S.6.3., ~~S.6.5.,~~ Table S.6.3.a. and Table S.6.3.b.

The weight display in a point-of-sale system must be marked with the scale capacity and the displayed scale division, regardless of the location of the weight display in the system. If the analog-to-digital converter for the scale is located in the ECR, then the ECR must also be marked with the accuracy class and the operating temperature range of the weighing system if different from -10 °C to 40 °C (14 °F to 104 °F).

The lettering must be permanent as described in section 1, but the attachment of any badge or decal is slightly less stringent than for the G-S.1. information. In terms of attachment, any badge or decal must be “durable,” that is, it must be difficult to remove (at all temperatures).

- 7.1. The capacity and value of the scale division shall be marked or indicated in a clear and conspicuous manner and be readily apparent when viewing the reading face of the scale indicator adjacent to the weight display. Yes ☐ No ☐ N/A ☐

*There are no additional changes recommended for Section 7.*

Agenda Item 1 (d) **Time Dependence (Creep Test) for Scales**

## **58. Time Dependence Test for Scales and Separable Load-receiving Elements** **Code References: T.N.4.5.1. and T.N.4.5.2.**

This test shall be conducted on Class II, III, and IIII complete scales and weighing/load-receiving elements in a laboratory. The applied load shall be between 90 % and 100 % of capacity for scales with capacities of 2000 lb or less. For scales with capacities greater than 2000 lb, the load cell or load cells shall be tested individually. The test shall be conducted at the temperature extremes specified for the device under test (DUT).

For Class III L scales that cannot be tested in the laboratory, the load cell or load cells shall have an NTEP Certificate of Conformance and be suitable for the device(s) submitted for evaluation with respect to  $n_{max}$ ,  $v_{min}$  nominal capacity, maximum capacity, accuracy class, temperature limits, single or multiple load cell application, minimum dead load, and safe load limit.

- 58.1. ~~After the application of the load at constant test conditions, the indications after 20 seconds and 1 hour shall not differ by more than the absolute value of the applicable tolerance.~~ Yes ☐ No ☐ N/A ☐

Load the instrument close to Max. Take one reading as soon as the indication has stabilized and then note the indication in one hour intervals while the load remains on the instrument for a period of four hours. During this test the temperature should not vary more than 2 °C.

The test may be terminated after 30 minutes if the indication differs less than 0.5 e during the first 30 minutes and the difference between 15 and 30 minutes is less than 0.2 e.

If these conditions are not met, the difference between the indication obtained immediately after placing a load on the instrument and the indication observed during the following four hours shall not exceed the absolute value of the maximum permissible error at the load applied.

- 58.2. The deviation in the zero indication before and after a period of loading with a load close to Max for half an hour, shall be determined. The reading shall be taken as soon as the indication has stabilized. Yes ☐ No ☐ N/A ☐

For multiple range instruments, continue to read the zero indication during the following 5 minutes after the indication has stabilized.

If the instrument is provided with zero-tracking, it shall not be in operation during the test.

### TIME DEPENDENCE TEST FORM

Code Reference: T.N.4.5.1.

Control No.: \_\_\_\_\_  
Pattern designation: \_\_\_\_\_  
Date: \_\_\_\_\_  
Observer: \_\_\_\_\_  
Verification scale interval e: \_\_\_\_\_  
Resolution during test (smaller than e): \_\_\_\_\_

	At start	At max	At end	
Temp:				°C
Rel. h:				%
Time:				
Bar. Pres:				hPa

(Only Class I)

Zero-tracking device is:

☐ Non-existent ☐ Not in operation ☐ Out of working range

$$E = I + 0.5 e - \Delta L - L$$

Load L	Time of Reading	Indication I	Add. Load $\Delta L$	Error	mpe
	Initial + 20 sec				
	5 min				
	15 min				
	30 min				
If the difference between the indication obtained at 15 minutes and that at 30 minutes exceeds 0.2 e, the difference between the indication obtained immediately after placing the load on the instrument and the indication observed during the following four hours shall not exceed the absolute value of the maximum permissible error at the load applied.					
	1 hr				
	2 hr				
	3 hr				
	4 hr				

15 to 30 min ☐ Passed ☐ Failed  
0 to 30 min ☐ Passed ☐ Failed  
0 to 4 hr ☐ Passed ☐ Failed ☐ Not Applicable

### Time Dependence Zero Return

Zero-tracking device is:

☐ Non-existent ☐ Not in operation ☐ Out of working range

$$P = I + 0.5 e - \Delta L$$

Time of Reading	Load $L_0$	Indication of zero $I_0$	Add. load $\Delta L$	P
After loading for 30 minutes      Load = _____			Meaning of symbols:	
			I = Indication	
			$I_0$ = Indication of no-load reference at the start of the test	
			L = Load	
			$L_0$ = Mass of no-load reference at the start of the test	
			Add. load $\Delta L$ = Additional load to next changeover point	
			P = Digital indication prior to rounding = $I + 1/2 e - \Delta L$	
			E = Error = $I - L$ or $P - L$	
			mpe = Maximum permissible error	
			EUT = Equipment under test	
Change of indication $\Delta P =$ _____				
Check that $ \Delta P  \leq  MPE $ for Class III L devices				
Check that $ \Delta P  \leq 0.5 e$ for Class II, III, and IIII devices				
<input type="checkbox"/> Passed			<input type="checkbox"/> Failed	

Remarks: \_\_\_\_\_

Agenda Item 1 (e) **Time Dependence (Creep Test) for Load Cells**

**J. Tests to be Performed**

1. Force transducer (load cell) error with respect to temperature.
2. Repeatability based on results of test 1.
3. Temperature effect on minimum dead load output.
4. Creep (~~30-minute one hour~~ test per HB-44 or 30-minute test per OIML R 60).
5. Barometric pressure effect if the cell is sensitive to barometric pressure changes as determined by guidelines discussed in the section titled "Barometric Pressure Tests."

**L. Tolerances**

<b>Table 3</b> <b>Tolerance for Class III Force transducers (load cells)</b>				
<b>Handbook 44 Reference</b>	<b>Single Cell Requirement</b>		<b>Multiple Cell Requirement</b>	
Force transducer (load cell) Error Table 6, Class III; T.N.3.2., T.N.8.1.1.	<b>0.7 Factor Applied</b>		<b>1.0 Factor Applied</b>	
	<b>Load</b>	<b>Tolerance</b>	<b>Load</b>	<b>Tolerance</b>
	0 to 500v	0.35v	0 to 500v	0.50v
	501 to 2000v	0.70v	501 to 2000v	1.00v
	2001 to 4000v	1.05v	2001 to 4000v	1.50v
	4001 to 10 000v	1.75v	4001 to 10 000v	2.50v
Repeatability Error; T.N.5., T.N.8.1.1	<b>0.7 Factor Applied</b>		<b>1.0 Factor Applied</b>	
	<b>Load</b>	<b>Tolerance</b>	<b>Load</b>	<b>Tolerance</b>
	0 to 500v	0.70v	0 to 500v	1.00v
	501 to 2000v	1.40v	501 to 2000v	2.00v
	2 001 to 4000v	2.10v	2 001 to 4000v	3.00v
	4001 to 10 000v	3.50v	4001 to 10 000v	5.00v
Creep (test at 90- 100% of force transducer (load cell) capacity); T.N.4.5.	<b>1.0 Factor Applied</b>		<b>1.0 Factor Applied</b>	
	<b>Load</b>	<b>Tolerance</b>	<b>Load</b>	<b>Tolerance</b>
	0-500v	0.50v	0-500v	0.50v
	501-2000v	1.00v	501-2000v	1.00v
	2001-4000v	1.50v	2001-4000v	1.50v
	4001-10 000v	2.50v	4001-10 000v	2.50v
Temperature Effect on Minimum Dead Load Output; T.N.8.1.3. T.N.8.1.1	0.7 v <sub>min</sub> /5 °C		0.7 v <sub>min</sub> /5 °C	
Effects of Barometric Pressure; T.N.8.2.	Applicable only to specified force transducers (load cells) 1 v <sub>min</sub> /1kPa		Applicable only to specified force transducers (load cells) 1 v <sub>min</sub> /1kPa	

<b>Table 4</b> <b>Tolerance for Class III L Force transducers (load cells)</b>				
<b>Handbook 44 Reference</b>	<b>Single Cell Requirement</b>		<b>Multiple Cell Requirement</b>	
Force transducer (load cell) Error Table 6, Class III L; T.N.3.2., T.N.8.1.1.	<b>0.7 Factor Applied</b>		<b>1.0 Factor Applied</b>	
	<b>Load</b>	<b>Tolerance</b>	<b>Load</b>	<b>Tolerance</b>
	0 v to 500 v	0.35 v	0 v to 500 v	0.50 v
	501 v to 1 000 v <sup>1</sup>	0.70 v	501 v to 1 000 v <sup>2</sup>	1.00 v
	<sup>1</sup> Add 0.35v to the tolerance for each 500v of load or fraction thereof up to a maximum load of 10 000v		<sup>2</sup> Add 0.50v to the tolerance for each 500v of load or fraction thereof, up to a maximum load of 10 000v	
Repeatability Error; T.N.5., T.N.8.1.1.	<b>0.7 Factor Applied</b>		<b>1.0 Factor Applied</b>	
	<b>Load</b>	<b>Tolerance</b>	<b>Load</b>	<b>Tolerance</b>
	0 v to 500 v	0.70 v	0 v to 500 v	1.00 v
	501 v to 1 000 v	1.40 v	501 v to 1 000 v	2.00 v
	9001 v to 9500 v	13.30 v	9001 v to 9500 v	19.00 v
	9501 v to 10 000 v	14.00 v	9501 v to 10 000 v	20.00 v
	<sup>3</sup> Add 0.70v to the tolerance for each 500 v of load or fraction thereof up to a maximum load of 10 000v		<sup>4</sup> Add 1.00v to the tolerance for each 500v of load or fraction thereof up to a maximum load of 10 000v	
<del>Creep (test at 90-100% of force transducer (load cell) capacity); T.N.4.5.</del>	<del><b>1.0 Factor Applied</b></del>		<del><b>1.0 Factor Applied</b></del>	
	<del><b>Load</b></del>	<del><b>Tolerance</b></del>	<del><b>Load</b></del>	<del><b>Tolerance</b></del>
	<del>0-500v</del>	<del>0.25v</del>	<del>0-500v</del>	<del>0.25v</del>
	<del>501-1000v</del>	<del>0.50v</del>	<del>501-1000v</del>	<del>0.50v</del>
	<del>9001-9500v</del>	<del>4.75v</del>	<del>9001-9500v</del>	<del>4.75v</del>
	<del>9501-10 000v</del>	<del>5.00v</del>	<del>9501-10 000v</del>	<del>5.00v</del>
	<del><sup>5</sup>Add 0.25v to the tolerance for each 500v of load or fraction thereof up to a maximum load of 10 000v</del>			
Temperature Effect on Minimum Dead Load Output; T.N.8.1.3. T.N.8.1.1	2.1 v <sub>min</sub> /5 °C		2.1 v <sub>min</sub> /5 °C	
Effects of Barometric Pressure; T.N.8.2.	Applicable only to specified force transducers (load cells) 1 v <sub>min</sub> /1kPa		Applicable only to specified force transducers (load cells) 1 v <sub>min</sub> /1kPa	

## II. Determination of Creep

- At 20 °C ambient, insert the force transducer (load cell) into the force generating system and load to the minimum dead load. If Procedure I. (which includes increasing and decreasing load tests) has just been completed, wait 1 hour. If a separate creep test is being conducted, exercise the force transducer (load cell) as in Procedure I.5 and then wait 1 hour.
- If the indicating element for the force transducer (load cell) is provided with a convenient means for checking itself, conduct the self-test at this time.
- Monitor minimum load output until stable.



4. ~~There are two test methods to determine the creep characteristics of force transducers (load cells). The 1-hour creep test at the maximum load (step 4. (a)) is the preferred form of the creep test; run the return to zero creep test (step 4. (b)) only when justified by limitations in the test equipment. The NTEP will conduct step 4. (a) creep tests whenever possible.~~

~~Take readings at 1 minute time intervals for the first 10 minutes and every 10 minutes thereafter.~~

- a. **Test for Creep:** Apply a load equal to 90 % to 100 % of the maximum capacity of the force transducer (load cell) and record the indication 20 seconds after reaching the load. The time to load test weights and read the indicator shall be as short as possible and shall not exceed the time specified in Table 5. ~~With the load remaining on the load cell, c~~Continue to record indications periodically, thereafter at time intervals over a ~~30 minute 1-hour~~ period.

*Note: A 30-minute test is acceptable if the creep test is performed in accordance to OIML R 60 tolerances.*

- b. Remove a load equal to 90 % to 100 % of the maximum capacity of the force transducer (load cell) that has been applied for ~~1 hour 30 minutes~~. Record the indication after 20 seconds. The time to unload test weights and read the indicator shall be as short as possible and not exceed the time specified in Table 5. Continue to record indications periodically thereafter at time intervals over a 1 hour period (or 30 minutes if the creep test is conducted according to OIML R 60 requirements).

Table 5 Loading Times		
Load		Time
Greater than	To and including	
0 kg	10 kg	10 s
10 kg	100 kg	15 s
100 kg	1 000 kg	20 s
1 000 kg	10 000 kg	30 s
10 000 kg	100 000 kg	50 s
100 000 kg	-----	60 s

5. Repeat the operations described in steps 2 through 4 at the high and low temperature limits for the accuracy class. ~~if~~ If the manufacturer has specified a smaller or a larger range, repeat operations at the limits marked on the cell, provided the temperature range is at least the range required for the accuracy class.
6. With the resulting data, and accounting for the effect of barometric pressure changes, determine the magnitude of the creep and compare it to the tolerance in NIST Handbook 44 Scales Code Table T.N.4.6.2.

<b>Table T.N.4.6.</b> <b>Maximum Permissible Error (mpe) * for Load Cells</b> <b>During Type Evaluation</b>			
<b>mpe in Load Cell Verifications Divisions (v) = <math>p_{LC} \times</math> Basic Tolerance in v</b>			
<b>Class</b>	<b><math>p_{LC} \times 0.5 \text{ v}</math></b>	<b><math>p_{LC} \times 1.0 \text{ v}</math></b>	<b><math>p_{LC} \times 1.5 \text{ v}</math></b>
<b>I</b>	0 v to 50 000 v	50 001 v to 200 000 v	200 001 v +
<b>II</b>	0 v to 5 000 v	5 001 v to 20 000 v	20 001 v +
<b>III</b>	0 v to 500 v	501 v to 2 000 v	2 001 v +
<b>IIII</b>	0 v to 50 v	51 v to 200 v	201 v +
<b>III L</b>	0 v to 500 v	501 v to 1 000 v	(Add 0.5 v to the basic tolerance for each additional 500 v or fraction thereof up to a maximum load of 10 000 v)

v represents the load cell verification interval  
 $p_{LC}$  represents the apportionment factors applied to the basic tolerance  
 $p_{LC} = 0.7$  for load cells marked with S (single load cell applications)  
 $p_{LC} = 1.0$  for load cells marked with M (multiple load cell applications)  
 \* mpe =  $p_{LC} \times$  Basic Tolerance in load cell verifications divisions (v)

Agenda Item **11. Performance and Permanence Tests for Railway Track Scales** Used to Weigh Statically

*The Weighing Sector recommendation to amend Publication 14 Performance and Permanence Testing for Railway Track Scales in Agenda Item 11 was modified as follows according to the results of a November 10, 2005.*

*The NIST Technical Advisor reported the results of the ballot, including comments, to the Sector and NTEP Committee prior to the 2006 NCWM Interim Meeting.*

**69. Performance and Permanence Tests for Railway Track Scales Used to Weigh Statically**

**(NOTE:** For combination vehicle/railway track scales, see also additional test considerations under "Test Considerations for Other Scales" in the application.)

It is desirable, but not required, that a new installation should be calibrated by a railroad test car after a representative of the railroad has inspected the installation for compliance with railroad design and construction specifications. A 100 000-lb field standard weight cart, or a combination of field standard weights *safely* added to a field standard weight cart for a total of 100 000-lb, will be used to conduct the initial NTEP calibration and test.

The permanence test shall not be conducted sooner than thirty (30) days after the initial NTEP test. If a 100 000-lb field standard weight cart, or a combination of field standard weights *safely* added to a field standard weight cart for a total of 100 000-lb, is not available for the subsequent permanence verification a 100 000-lb capacity railroad scale test car of may be used.

**NOTE:** A field standard weight cart shall have a footprint no greater than 7', which is the size of the footprint of railway track test weight cars. [The Association of American Railroad Scale (AAR) Handbook 2005 Revision © requirements for "standard railway track scale test weight car" can be found in AAR Handbook for Scales Sections 1.5. through 1.5.5. A standard rail car, as described in AAR Handbook Section 1.5.6., is not suitable for use during NTEP evaluations since the entire load of the rail car can not be concentrated in a footprint no greater than 7".]

Performance tests are conducted to determine compliance with the tolerances and, in the case of nonautomatic indicating scales, the sensitivity requirements specified in NIST Handbook 44. The tests described here apply primarily to the weighing/load-receiving element. It is assumed that the indicating element used during the test has already been examined and found to comply with applicable requirements. If the design and performance of the indicating element is

*to be determined during the same test, the applicable requirements for weighbeams, poises, dials, electronic digital indications, etc., must also be referenced.*

#### 69.1. Influence Factors

If tests are necessary to determine compliance with influence factors, individual main elements and components tests must be conducted according to NTEP Policy that is outlined in NCWM Publication 14, Section B.1. Influence Factor Requirements.

#### 69.2. Test Standards

~~The A 100 000-lb field standard weight cart or a 100 000-lb combination of field standard weights safely added to a field standard weight cart GIPSA type or equivalent test car or 100 000-lb field standard weight carts (see Handbook 44 Scales Code paragraph N.3.2.) shall be used for the initial test using a minimum of 100 000-lb of known test weights, generally in increments of 10 000 lb. Railroad test weight cars shall not be used exclusively for the initial test., but may be used as part of a substitution of strain load tests.~~

#### 69.3. Sensitivity and Discrimination Tests

##### 69.3.1. Weighbeams

The sensitivity test is conducted at zero load and at maximum load. The sensitivity test is conducted by determining the actual test weight value necessary to bring the beam from a rest point at the center of the trig loop to rest points at the top and bottom of the trig loop. The maximum load at which the sensitivity test is conducted need not be comprised of known test weight.

#### 69.4. Digital Indications

Width-of-zero, zone of uncertainty, and automatic-zero-setting mechanism (if so equipped) tests shall be conducted as specified in other sections of NCWM Publication 14 this Handbook.

#### 69.5. Increasing Load and Section Tests

69.5.1. ~~With the test car off one end of the scale, remove weights from car and place on the end (closest section) of the scale. A minimum of three observations shall be made at with test weight loads of at least 30 000 lb, 40 000 lb and 50 000 lb test loads moving test cart across the scale in both directions.~~<sup>12</sup> Readings may be taken at 10 000 lb and 20 000 lb increments. Additional observations shall be made with ~~the a~~ 50 000-lb test weight load. Remove test weight load from scale before moving in opposite direction and ~~farthest section,~~ record any zero balance change. ~~Zero the scale if necessary, and repeat this test moving the weights in the opposite direction. When the weights have been returned to the starting point the near section near the test car,~~ apply additional loads, making observations in increments equal to the value of each test weight (10 000 lb) up to 100 000 lb at each end if practical. Repeat tests with the load concentrated to the right and left over each section and midway between sections in both directions.

69.5.2. The results shall be within acceptance tolerance.

#### 69.6. Strain Load Tests

The minimum test load for a strain-load test for single-load-receiving element platform scales greater than 35 feet and for multiple- load-receiving element platform scale systems designed to weigh railroad cars in a single draft is 200 000 lb.

69.6.1. .Place a strain load ~~(as a minimum, use the GIPSA or a GIPSA type test car without weights)~~ on the scale so that the test load can be placed on one end section and observe the weight to the smallest increment practical. Add a test weight load(s) to end section. ~~If practical, repeat this test on the other end section.~~

Remove the test load, observing any balance change, then remove the strain load. If practical, repeat this test on the other end section. Conduct any sensitivity and discrimination tests at maximum load.

69.6.2. Place the strain load and the empty GIPSA or GIPSA type test car on the load receiving element platform so that the weights can be incrementally loaded from the weight cart, which remains off the platform. Observe weight to the smallest increment practicable. Load the test car with the test weights. Observe weight indications in increments equal to each added test weight (10 000 lb). At this maximum load, sensitivity and discrimination tests should be conducted.

69.6.3. 69.6.2. The results of all observations shall be within acceptance tolerance.

#### 69.7. Permanence Test

The permanence test shall be conducted after a minimum of 20 days after successful completion of the initial performance test. It is recommended that the performance tests described above be repeated. However, if the original test cart (and additional field standards if applicable) is not available, the test may be conducted to the extent possible with at standard railway track scale test weight car with at least a 100 000-lb capacity and a suitable and current calibration report. least two railroad test weight cars. The results of this test must be within acceptance tolerance.<sup>13</sup> If the device does not meet these tolerance limits the scale will be rejected and the entire test must be repeated, including successful initial performance testing and a subsequent test after a minimum of 30 days.

##### 69.7.1 Minimum Use Requirements for the Field Permanence Test

69.7.1.1 There must be at least 300 weighing operations executed over the scale prior to conducting the type evaluation permanence test. The permanence test should be performed at a customer location to be able to evaluate “normal” use.

69.7.1.2 The minimum time period of use is 30 days with a minimum of 300 weighing operations as described below. The subsequent permanence test should be tentatively scheduled when the initial test is started. If the 300 weighing operations have not been completed by that time, the time for the field permanence test shall be extended until at least 300 weighing operations have been completed. The second phase of the permanence test can be conducted as soon as 300 weighing operations have been achieved, but no sooner than 30 days after the initial test of the field permanence test. Acceptance tolerances apply regardless of the length of the test.

69.7.1.3 Only loads, which reflect “normal” use, will be counted during the permanence-testing period.

- 100 % of the loads must be above 20 % of scale capacity; and
- 50 % of the loads must be above 50 % of scale capacity.

The scale may be used to weigh other loads, but only the loads specified above are counted as part of the permanence test.

##### 69.7.2 Subsequent Type Evaluation (Field) Permanence Test

A minimum of two increasing-load, two decreasing-load, and two section tests are to be conducted a minimum of 30 days after the initial tests. However, if the original field standard weight cart is not available, the test may be conducted to the extent possible with at least one railroad test cars. Strain load tests shall be conducted with a minimum 200 000-lb test load. If the test results are at or near acceptance tolerance limits, at least one more set of tests should be conducted immediately to verify the test results and determine device repeatability.

Repeat width-of-zero, zone of uncertainty, sensitivity, and discrimination tests near zero (outside the range of the AZSM) and at or near capacity on the subsequent tests.

If the device does not meet these tolerance limits, the entire test must be repeated, including successful initial performance testing and a subsequent test after a minimum of 30 days and an additional 300 weighing operations as described in the criteria above.

<sup>12</sup> Do not exceed section capacity

<sup>13</sup> ~~If the subsequent performance test cannot be completed within 30 days because of the unavailability of test cars, maintenance tolerance will be applied.~~

Agenda Item **12. Cash Acceptors or Card-activated Systems**

**Publication 14 ECRS, Section 13. Cash Acceptors or Card-activated Systems**

**Code References: G-S.2., G-S.5.1., G-S.6**

(Note: Language changes and additions approved by the 2005 NTEP Committee are indicated in ~~shaded, strike out, and underlined~~ text. Language changes and additions recommended by the Weighing Sector are indicated in **bolden, strike out, and underlined** text.)

- |            |                                                                                                                                                                                                                                                                                                  |                                                                                                  |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| 13.6.      | Printed Receipt - A printed receipt must be available to the customer from the device at the completion of the transaction.                                                                                                                                                                      | Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>            |
| 13.7.      | <del>Because the customer must be provided with a receipt, if</del> The system must not accept cash if sufficient paper is not available to complete the transaction.                                                                                                                            | <del>Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/></del> |
| 13.8       | The cash acceptor must not initiate a cash <b>or card</b> transaction if <b>one either</b> of the following conditions are true:                                                                                                                                                                 | <del>Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/></del> |
|            | • no paper is in the receipt printer of the cash <b>or card</b> acceptor;                                                                                                                                                                                                                        | <del>Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/></del> |
|            | • insufficient paper is available to complete a transaction; <b>or</b>                                                                                                                                                                                                                           | <del>Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/></del> |
|            | • <u>the ECR receipt must be capable of being recalled and printed on a different printer. Instructions shall be displayed on the customer display or printed (if there is sufficient paper) directing the customer to see the store attendant or manager for a printed copy of the receipt.</u> | <del>Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/></del> |
| 13.9.      | Instructions must be marked on the device to inform the customer how to operate the cash <b>or card</b> acceptor.                                                                                                                                                                                | Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>            |
| 13.10.     | Means must be provided for the customer to cancel the transaction at any point.                                                                                                                                                                                                                  | Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>            |
| 13.10.1.   | If the customer cancels the transaction by pressing the cancel key (or equivalent key(s)), after the cash has been accepted, the device must either:                                                                                                                                             |                                                                                                  |
| 13.10.1.1. | be equipped with means for the customer to retrieve the cash inserted from the device, AND                                                                                                                                                                                                       | Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>            |
|            | automatically issue a printed receipt indicating the amount of <u>cash</u> tendered and the amount returned, OR                                                                                                                                                                                  |                                                                                                  |
| 13.10.1.2. | display instructions (such as "sale <b>canceled terminated</b> , see attendant," "sale <b>canceled terminated</b> , get receipt" or similar wording) for the customer to see the attendant, AND                                                                                                  | Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>            |
|            | automatically issue a printed receipt showing the amount of cash inserted by the customer, a statement indicating that the sale was <b>canceled terminated</b> , and instructions for the customer to see the attendant.                                                                         |                                                                                                  |
| 13.11.     | <u>Means must be provided for the customer to retrieve correct change if the device has insufficient money to return to the customer.</u>                                                                                                                                                        | <del>Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/></del> |
|            | <u>The device must display instructions (such as "insufficient change, see attendant," or similar wording) directing the customer to see the attendant, AND</u>                                                                                                                                  |                                                                                                  |

Automatically issue a printed receipt showing the amount of cash inserted by the customer, a statement indicating that the sale was ~~canceled terminated~~, and instructions for the customer to see the attendant.

*Note: It is acceptable for different messages to be used when providing instructions to the customer. This depends upon whether the transaction is terminated by use of the cancel key, insufficient receipt paper, or insufficient change (e.g., "sale terminated, get receipt," or "sale terminated, see cashier," or "change due, see cashier").*

#### Agenda Item **14. CLC for Combination Railway Track/Vehicle Scales**

##### **8.3. Modular Load-Cell Vehicle, Livestock, or Railroad Track Scales**

**NOTE:** *These criteria apply if the scale is fully electronic (i.e., load cells comprise the sensors of the weighing/load-receiving element) and is of a modular design.*

**Modular Scale.** A vehicle, livestock, or railroad track scale made up of individual load-receiving elements of like design, which can be joined together to form a larger integral load-receiving element and can be separated at any time without structurally changing the individual load-receiving elements. This definition is to be applied for all new type evaluations and for applications to add new devices to an existing CC (see Figure 3).  
(Effective January 2001)


##### **8.3.1. Modular Scale to be Tested**

The following criteria must be satisfied in the scale design and the scale to be tested:

- a. Load cells of the same design and capacity that consists of simply attaching modules together must be used throughout the family. If load cells of different capacities are used for scales of different structural design ~~weighbridge~~ strength and nominal capacity in the family of scales, then the module using the higher capacity load cells must be evaluated.
- ~~b. CLC in the family must be not less than 40 percent of the sum of the capacity of two load cells or 80 percent of the capacity of one cell.~~
- ~~e-b.~~ A scale with at least two modules must be tested. The module with the largest CLC is to be tested. If the longest span between sections is not tested, the CC will include up to 120 % of the span between sections that was tested. Arrangements regarding the specific scale in the family to be tested will be established in consultation with NTEP representatives.

Agenda Item 15. **Abbreviations** for Carat and Count in Publication 14 Sections 38 and 76.

### 38. Counting Feature on Class I or II Scales Used in Prescription Filling Applications

- 38.3. The scale display differentiates between count indications and weight indications. **Yes ☐ No ☐ N/A ☐**  
(See Section 76 for acceptable abbreviations and symbols)
- 38.3.1. The abbreviation or symbol “pc(s),” “ct,” or “cnt” may be used to identify count or pieces. **Yes ☐ No ☐ N/A ☐**
- 38.3.2. If abbreviation or symbol “ct” is used to identify count, in a separate display for other than weight information, the “ct” or “e” shall not be -it is not used to identify carat in the weight display weighing mode. **Yes ☐ No ☐ N/A ☐**
- 38.3.3. If symbol “ct” is used to identify count in a shared or combined display, the same abbreviation “ct” or “e” for carat shall not be used to identify the carat unit of measure and count. **Yes ☐ No ☐ N/A ☐**
- 38.4. Values must be identified with an adequate the word, abbreviation, or symbol for pieces (pes) or count (ct). If the symbol  shown in Section 76. Table of Acceptable Abbreviations/Symbols is used and is intended for the customer, it cannot be used without additional description, marks, or directions displayed or marked on the device). **Yes ☐ No ☐ N/A ☐**

### 76. List of Acceptable Abbreviations/Symbols

Device Application	Term	Acceptable	Not Acceptable
<b>General:</b>	Piece(s)	Pieces, <u>pc</u> , or pcs	
	Count	count, <u>cnt</u> , or <u>pc(s)</u> is encouraged for symbol for pieces. <u>ct</u> is acceptable (HB-130)	<u>c</u>
<b>Values Defined:</b>	Other symbols	General Table of Weights And Measures, HB-44*	
<b>Values Defined (cont)</b>	<u>carat</u> carat or carat troy = 200 mg	<u>c</u> (HB-44 and NIST Guide for the Use of the International System of Units (SI) by B. N. Taylor) <u>ct</u> (common jewelry industry terminology and is only acceptable by Canada)	<u>ct</u> (is not permitted if used as the abbreviation for carat and count on a scale with an enabled count feature)
<b>*Exceptions to Gen'l Tables of W&amp;M, HB-44:</b>	carat carat or carat troy = 200 mg	<u>ct, e</u> (common jewelry industry terminology)	<u>ct</u> (is not permitted if used as the abbreviation for carat and count on a scale with an enabled count feature)
	U.S. short ton	Ton or TN	



Agenda Item **16. Performance and Permanence Test** for Bench and Counter Scales

### 63. Performance and Permanence Tests for Counter (Bench) Scales (Including Computing Scales)

63.6.5. Test load:

63.6.5.1. For laboratory tests of scales with a capacity of 1 000 lb or less, the test load required for the permanence test is 50 % of maximum capacity, distributed uniformly over the load points of the scale.

63.6.5.2. For laboratory tests of scales with a capacity greater than 1 000 lb, the test load required for the for the permanence tests is 250 kg (550 lb), distributed uniformly over the load points of the scale.

63.6.10. Step 4: Apply a test load of 50 % capacity, not to exceed 250 kg (550 lb), approximately 25 000 times. It is recommended that the frequency and speed of application of the load shall allow the instrument to come to rest both when loaded and unloaded.

Agenda Item **18. AWS Influence Factor Temperature Ranges** that Exceed –10 °C to 40 °C

## B. Certificate of Conformance Parameters

### 1. Influence Factors Requirements

Although NIST Handbook 44 contains a set of influence factors requirements, not all devices must be tested for all of the influence factors. The following table identifies the influence factor tests to be conducted on various devices. The main elements and components (indicating elements and load cells) of scales with a capacity greater than 2000 lb must be tested separately for compliance with the influence factors requirements.

Devices To Be Tested For Influence Factors							
Device Type	Temperature Accuracy <sup>1</sup>	Temp. Zero Drifts	Barometric Pressure	Warm-up Time	Voltage <sup>4</sup>	Power Interruption <sup>5</sup>	Time Dependence
Scales ≤ 2000 lb	X	X	X <sup>1</sup>	X	X	X	X
...							
Load Cells							
...							
<sup>1</sup> Testing is limited to some canister load cells. <sup>2</sup> Compliance with influence factors requirements will be determined according to existing NTEP policy. <sup>3</sup> Test limited to power switch only, not to initial plug-in of the device. <sup>4</sup> Voltage test is 130 and 100 VAC and low battery test on DC. (See Section K 60.) <sup>5</sup> Power interruption is pulling the plug for 10 seconds. (See Section K.19.) <sup>6</sup> Indicating elements processing only digital information do not have to be tested for compliance with the influence factors. <sup>7</sup> <u>Compliance with temperature requirements by NTEP is limited to temperatures that are no lower than –10 °C and no higher than 40 °C.</u>							

## 59. Test Procedures for Influence Factors

### Introduction

Influence factors are variables in the environment that might affect the performance of a scale, especially the accuracy and sensitivity (or discrimination) of the device. The T.N.8. section of the Scales Code in Handbook 44 specifies performance requirements for scales over given ranges. The test equipment, (e.g., thermometers, hygrometers, timing devices) must be sufficiently accurate that their errors do not contribute significantly to the measurement results. The environmental chamber must satisfy specified conditions. In general, good laboratory practices must be followed.

The test procedures of the International Electrotechnical Commission are excellent background material and provide guidance for performing the influence factors tests. The use of these documents is encouraged. Compliance with temperature requirements by NTEP is limited to temperatures that are no lower than  $-10^{\circ}\text{C}$  and no higher than  $40^{\circ}\text{C}$ .

Not all devices are affected . . .



## Appendix B

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